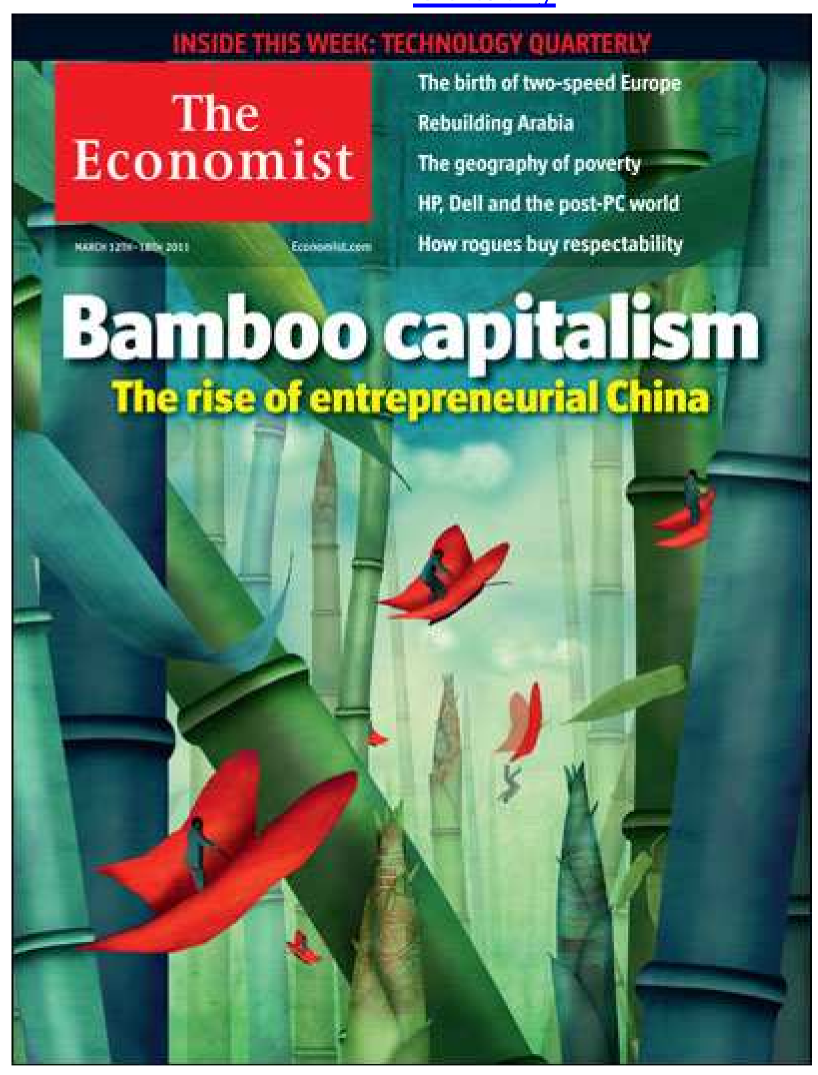
# The Economist

March , 2011





# Politics this week




Fighting between supporters of Colonel Muammar Qaddafi and rebel troops continued in **Libya**. Amid fierce battles the colonel's forces seemed to have regained control of Zawiya, a city near Tripoli. Ras Lanuf, an oil port held by his opponents, came under heavy aerial bombardment. See article

Debate intensified outside Libya over whether a **no-fly zone** should be imposed, which the rebels are calling for with growing desperation. America said the UN must endorse the idea, which Russia seems determined to oppose. See article

A **Tunisian** court dissolved the Rally for Constitutional Democracy, the party of the ousted president, Zine el-Abidine Ben Ali. Two days before, Beji Caid Sebsi, the interim prime minister, announced a new government to run the country until elections in July. The ministry of the interior dissolved the secret police.

At least 13 people died in a sectarian row when **Coptic Christians** protested against the burning of a church on the outskirts of Cairo.

In a move by the **Iranian** authorities to weaken the country's opposition still further, Akbar Hashemi Rafsanjani, a former president, lost his position as head of the powerful Assembly of Experts, the body that is supposed to supervise the supreme leader and choose his successor. See article

Violence continued to worsen in **Cote d'Ivoire,** where four marchers were shot dead while protesting against the killing of seven women the week before. The perpetrators were supporters of Laurent Gbagbo, the former president, who is refusing to relinquish power after losing an election in November. See article

**Navigating tricky waters**

The International Court of Justice ruled that **Nicaragua** must remove its troops from Calero Island in **Costa Rica**. Nicaragua sent the soldiers there last year when it began dredging a channel around the island in the San Juan river, which marks the border between the two countries. However, the court said that Nicaragua could go on dredging, despite Costa Rica's claim of environmental damage.

The **United States** agreed to let trucks from **Mexico** operate across their border in accordance with the North American Free-Trade Agreement, ending a lengthy dispute. In return, Mexico said it would lift tariffs that it imposed in 2009.




**Colombia's** FARC guerrillas abducted 23 workers at a Canadian oil company in the eastern jungle region of Vichada. Colombia's army and air force quickly found the kidnappers and forced them to release 21 of the hostages.

**Reopening for business**

Barack Obama ordered the resumption of military trials at **Guantanamo**, ending a suspension while the White House pondered the future of the detention camp. Mr Obama had wanted Guantanamo to close more than a year ago, but a plan to try suspected terrorists in civilian courts was fiercely opposed.

After a three-week stand-off that has brought tens of thousands of protesters on to the streets of the state capital, Republicans in **Wisconsin's** Senate passed a measure to curb the collective-bargaining rights of public-sector workers, forcing the bill through with a procedural manoeuvre as Democrats stayed away. See article

The governor of Illinois signed a bill ending the **death penalty** after an 11-year moratorium, making his state the 16th without capital punishment.

**Fatal figures**

The UN reported that 2,777 civilians were killed in **Afghanistan** in 2010, making it the country's most lethal year in the current conflict. Hamid Karzai, the president, said he would convene a *loya jirga*, a formal conclave of tribal elders, to discuss sensitive questions raised by America's plan to withdraw its forces by 2014. The *jirga* could decide, for instance, whether to keep America's permanent bases.

A bomb killed 25 people near an office of **Pakistan's** national intelligence agency in the city of Faisalabad. The Pakistani Taliban claimed responsibility. The next day a suicide-bomber in the west of the country killed at least 37 members of an anti-Taliban militia.

The National People's Congress gathered for one of **China's** five-yearly economic planning sessions. One resolution calls for spending $200 billion to build affordable housing, which might relieve pressure on property prices. See article

The Dalai Lama said he will relinquish his role as the leader of **Tibet's** government-in-exile. He made the announcement on the anniversary of the 1959 Tibetan revolt against Chinese rule. His role is to be filled by an elected representative at some future date.

Seiji Maehara, **Japan's** foreign minister, resigned after just six months in office after admitting he had accepted $3,000 in donations from a Korean resident of Japan. The speed of Mr Maehara's resignation shocked the government. His successor, Takeaki Matsumoto, vowed to continue efforts to improve relations with America. See article

**Jacques in a box**

**Jacques Chirac**, a former French president, went on trial for allegedly misappropriating public funds during his time as mayor of Paris. But before Mr Chirac entered the dock, the judge accepted a legal objection from one of his co-defendants and suspended the case for up to three months. See article

**Serbia** and **Kosovo** began high-level talks in Brussels. Serbia does not accept Kosovo's independence, but agreed to discuss practical matters such as transport.

**Estonians** re-elected the Reform party in a general election, despite a bruising recession. Andrus Ansip, the prime minister, will now have to choose whether to remain in coalition with the conservative IRL party or to govern with the Social Democrats. See article

Worries grew over press freedom in **Turkey** when more journalists were arrested and charged with involvement in a coup plot. The European Union and others expressed concern; the government said the arrests were not a response to critics in the media. See article




Though turnout was low, voters in **Wales** overwhelmingly backed proposals in a referendum for more devolution from Westminster. The Welsh Assembly will be able to initiate laws in 20 areas, including education, when it gets the new powers in May.

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# Business this week

The trial began in New York of Raj Rajaratnam, the founder of Galleon, a hedge fund. Mr Rajaratnam is accused of operating a network of informers that provided him with illegal share tips between 2003 and 2009 in one of the biggest **insider-trading** cases in history; 26 traders and executives have been charged. See article

Britain's Serious Fraud Office arrested several men in an investigation into the collapse of **Kaupthing** bank in 2008. The bank was based in Iceland but a substantial chunk of its business came from Britain. Two of those briefly held were Robert and Vincent Tchenguiz, famous and fraternal property developers.

**More angst in the euro zone**

Moody's downgraded **Spain's** sovereign-debt rating by one notch, to Aa2, over concern about the cost of bailing out its banks, and lowered **Greece's** by three notches, to B1, over worries it might need to restructure its existing debt after 2013. Meanwhile, yields rose once again on **Portuguese** government bonds to even more intolerable levels.

America's **unemployment** rate stood at 8.9% in February, the first time it has dipped below 9% since April 2009. Employers added 192,000 workers to the payrolls, the most since May of last year.

There were more grumbles in Britain about bankers' pay. Barclays revealed that the salaries and **bonuses** received by Bob Diamond, its chief executive, and the two bosses of Barclays Capital, its investment bank, totalled pound30m ($46m). Stephen Hester, the chief executive of Royal Bank of Scotland, in which the government holds a majority stake, was given a pay package worth pound7.7m, mostly in deferred shares.

**Mervyn King**, the governor of the Bank of England, raised a few eyebrows in the City when he criticised banks that make profits from "unsuspecting customers, particularly institutional customers" and said that banks which are "too important to fail" are tempted by excessive risk and bonuses because they know the state will bail them out. Last month the government reached a political truce over pay with big banks.

**Metal tops**




The price of **gold** touched a new nominal record of $1,444.95 a troy ounce and **silver** reached a 31-year high of $36.75, as investors continued to hedge against inflation.

**EADS** reported a net profit of euro553m ($732m) for 2010 on the back of a surge in orders for Airbus aircraft. The European aerospace company also had a net cash pile of almost euro12 billion at the end of the year, which it could use to boost its business in America. EADS recently lost out to Boeing in a lengthy and controversial bidding process for a lucrative contract to build flying tankers for the American air force.

**Rolls-Royce** and **Daimler** set up a joint venture to bid for **Tognum**, a German company that makes engines and propulsion systems for ships and trains. Parts of the company, including the MTU diesel-engine division, used to be owned by Daimler. At euro3.2 billion ($4.5 billion), the acquisition would be its biggest since 2000, and the biggest ever for Rolls-Royce.

A court in Bangladesh ruled that the country's central bank did have the authority to force **Muhammad Yunus** to step down as managing director of Grameen, a bank he founded that has spearheaded microfinance lending programmes among the poor. Grameen said it was "very disappointed". Mr Yunus insisted the move was political and lodged an appeal.

The **Bulgari** family decided to sell its 127-year-old watch and jewellery firm to **Moet Hennessy Louis Vuitton** (**LVMH**), the world's biggest luxury-goods company. The euro4.3 billion ($6 billion) deal is the latest in a string of purchases of family-owned brands by Bernard Arnault, LVMH's boss, though the Hermes family has so far resisted his overtures to buy it out of its high-end consumer-goods business. See article

**Google oops**

**Google** found at least 50 malicious apps being sold at its **Android** store, which customers downloaded on 260,000 smartphones before the breach was discovered. It is an embarrassment for Google; its procedures for pre-checking apps for its operating platform are considered to be not as robust as those at Apple and BlackBerry, relying more on user feedback. Android is the most widely used smartphone platform in America.

**Subway** overtook **McDonald's** to become the world's biggest fast-food chain by number of outlets in 2010, selling its submarine sandwiches at 33,749 eateries compared with the 32,737 premises that dished out McDonald's burgers. McDonald's is bigger by sales and operates in more countries. Subway opened its first outlet outside North America in 1984, in Bahrain.

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## Daily Chart

Mar 10th 2011 | From *The Economist* print edition




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China's economy

## Bamboo capitalism

**China's success owes more to its entrepreneurs than its bureaucrats. Time to bring them out of the shadows**




FEW would deny that China has been the economic superstar of recent years. Thanks to its relentless double-digit annual growth, it has become the world's second-largest economy and in many ways the most dynamic. Less obvious is quite what the secret of this success has been. It is often vaguely attributed to "capitalism with Chinese characteristics"-typically taken to mean that bureaucrats with heavy, visible hands have worked much of the magic. That, naturally, is a view that China's government is happy to encourage.

But is it true? Of course, the state's activity has been vast and important. It has been effective in eradicating physical and technological obstacles: physical, through the construction of roads, power plants and bridges; technical, by facilitating (through means fair and foul) the transfer of foreign intellectual property. Yet China's vigour owes much to what has been happening from the bottom up as well as from the top down. Just as Germany has its mighty *Mittelstand*, the backbone of its economy, so China has a multitude of vigorous, (very) private entrepreneurs: a fast-growing thicket of bamboo capitalism.

These entrepreneurs often operate outside not only the powerful state-controlled companies, but outside the country's laws. As a result, their significance cannot be well tracked by the state-generated statistics that serve as a flawed window into China's economy. But as our briefing shows, they are an astonishing force.

## The Mittel Kingdom

First, there is the scale of their activities. Three decades ago, pretty much all business in China was controlled by one level of the state or another. Now one estimate-and it can only be a stab-puts the share of GDP produced by enterprises that are not majority-owned by the state at 70%. Zheng Yumin, the Communist Party secretary for the commerce department of Zhejiang province, told a conference last year that more than 90% of China's 43m companies were private. The heartland for entrepreneurial clusters is in regions, like Zhejiang, that have been relatively ignored by Beijing's bureaucrats, but such businesses have now spread far and wide across the country.

Second, there is their dynamism. Qiao Liu and Alan Siu of the University of Hong Kong calculate that the average return on equity of unlisted private firms is fully ten percentage points higher than the modest 4% achieved by wholly or partly state-owned enterprises. The number of registered private businesses grew at an average of 30% a year in 2000-09. Factories that spring up alongside new roads and railways operate round-the-clock to make whatever nuts and bolts are

needed anywhere in the world. The people behind these businesses endlessly adjust what and how they produce in response to extraordinary (often local) competition and fluctuations in demand. Provincial politicians, whose career prospects are tied to growth, often let these outfits operate free not only of direct state management but also from many of the laws tied to land ownership, labour relations, taxation and licensing. Bamboo capitalism lives in a laissez-faire bubble.

But this points to a third, more worrying, characteristic of such businesses: their vulnerability. Chinese regulation of its private sector is often referred to as "one eye open, one eye shut". It is a wonderfully flexible system, but without a consistent rule of law, companies are prey to the predilections of bureaucrats. A crackdown could come at any time. It is also hard for them to mature into more permanent structures.

**Cultivate it, don't cut it**

All this has big implications for China itself and for the wider world. The legal limbo creates ample scope for abuse: limited regard for labour laws, for example, encourages exploitation of workers. Rampant free enterprise also lives uncomfortably alongside the country's official ideology. So far, China has managed this rather well. But over time, the contradictions between anarchic opportunism and state direction, both vital to China's rise, will surely result in greater friction. Party conservatives will be tempted to hack away at bamboo capitalism.

It would be much better if they tried instead to provide the entrepreneurs with a proper legal framework. Many entrepreneurs understandably fear such scrutiny: they hate standing out, lest their operations become the focus of an investigation. But without a solid legal basis (including intellectual-property laws), it is very hard to create great enterprises and brands.

The legal uncertainty pushes capital-raising into the shadows, too. The result is a fantastically supple system of financing, but a very costly one. Collateral is suspect and the state-controlled financial system does not reward loan officers for assuming the risks that come with non-state-controlled companies. Instead, money often comes from unofficial sources, at great cost. The so-called Wenzhou rate (after the most famous city for this sort of finance) is said to begin at 18% and can even exceed 200%. A loan rarely extends beyond two years. Outsiders often marvel at the long-term planning tied to China's economy, but many of its most dynamic manufacturers are limited to sowing and reaping within an agricultural season.

So bamboo capitalism will have to change. But it is changing China. Competition from private companies has driven up wages and benefits more than any new law-helping to create the consumers China (and its firms) need. And behind numerous new businesses created on a shoestring are former factory employees who have seen the rewards that come from running an assembly line rather than merely working on one. In all these respects the private sector plays a vital role in raising living standards-and moving the Chinese economy towards consumption at home rather than just exports abroad.

The West should be grateful for that. And it should also celebrate bamboo capitalism more broadly. Too many people-not just third-world dictators but Western business tycoons-have fallen for the Beijing consensus, the idea that state-directed capitalism and tight political control are the elixir of growth. In fact China has surged forward mainly where the state has stood back. "Capitalism with Chinese characteristics" works because of the capitalism, not the characteristics.

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The euro and the European Union

# Can Angela Merkel hold Europe together?

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**This may be remembered as the week Europe began to split apart. One woman could stop that**




GERMANY'S chancellor, Angela Merkel, has the future of Europe in her hands. As the biggest creditor country, Germany holds the key to resolving the euro zone's sovereign-debt crisis. As the continent's economic giant, it is the biggest determinant of the European Union's direction. And right now Europe may be embarking on a path that could tilt the union away from economic liberalism, risking a split and, ultimately, even a British exit.

Mrs Merkel seems to be sleepwalking into this danger. For all her sound instincts and skills as a politician, she appears to have no vision for the EU. She has been woefully slow to get to grips with the euro zone's troubles, largely because German voters do not want to bail out weak countries such as Greece, Ireland and potentially Portugal. And, in her efforts to assure her countrymen that she is imposing Teutonic discipline on the profligate peripherals, she is allowing the euro zone's role in forming the EU's economic policies to be greatly enlarged.

Two meetings this week illustrate this worrying development. A summit of 27 EU heads of government will be followed by a euro-zone summit that omits ten of them (see Charlemagne). This might seem an arcane bit of Brussels procedure. Indeed, the British, normally the most suspicious of euro-integration, are pretending that it does not matter. But other "out" countries are up in arms. Historians may come to see this as the moment when the EU split into a dominant, corporatist euro area and a smaller, more liberal outer zone. Mrs Merkel is clever enough to realise this and dislike it, but she has not been brave enough to stop it.

**Clubs within clubs**

The fear that the single currency could divide Europe has a long history, going back at least to the 1992 Maastricht treaty: and Germany has played a crucial role in keeping Europe together. In the 1990s it adamantly opposed a French scheme for an "economic government" as a counterweight to the European Central Bank, for fear of compromising the ECB's independence. Before the euro came into being in 1999 the then British chancellor, Gordon Brown, resisted the establishment of a "euro group" of finance ministers that excluded him. His French colleague, Dominique Strauss-Kahn, retorted that in a marriage one did not invite strangers into the bedroom.

Why would an overtly two-speed Europe matter? The British defend their passivity by pointing out that many EU policies and institutions only work by not including all members-the Schengen passport-free zone, defence co-operation, the planned EU patent. They add that the European Commission and the European Court of Justice will stop any euro-zone

grouping fiddling with the single market: and if the "ins" try something, the "outs" still retain vetoes on things like tax and benefit rules. If the euro zone wants an economic government, David Cameron is saying, let it create one: it won't affect us.

This is short-sighted. The history of the European project is replete with examples of policies set by a smaller group and later foisted on a broader one, from the common agricultural policy and the budget to the social chapter and the charter of fundamental rights. Other "out" countries, notably Sweden, Poland and Denmark, see this more clearly than Britain, and have reacted angrily to suggestions (originally opposed by Mrs Merkel) that euro-zone leaders should have more say over policy and meet more often (see article).

This is a matter not just of power but also of philosophy. The euro group of 17 is less liberal than the EU of 27. The distinction is not always clear-cut: the euro includes liberals like the Dutch, Irish and Finns, and the non-euro group has less liberal Hungary and Romania. But the centre of gravity of the euro zone lies at the less liberal end. The "pact for competitiveness" (now the "pact for the euro") that Mrs Merkel and France's Nicolas Sarkozy are promoting, for instance, includes the idea of harmonising corporate-tax bases, surely a step towards harmonised tax rates. Would a euro-zone economic government have heeded British objections to tougher hedge-fund regulation in 2010, or resisted Mr Sarkozy's one-time proposal that EU regional aid should be cut off for countries indulging in "harmful tax competition"? Would it fight so hard to defend free movement of labour? Would it now promote a stronger directive to break down barriers to trade in services?

Experience shows that formal votes and veto rights in EU summits do not offer complete protection. The EU is a club, not a parliament. When proposals get to a summit, they have momentum: you can fight one or two, but not the whole lot.

All this could present the "outs" with a hard choice. Some countries may hold their noses and try to join the euro in order to regain influence. But Britain would surely go the other way. Indeed, a less liberal euro-dominated club might even push the British into walking out altogether (see Bagehot). No doubt that would delight Eurosceptics; but if Britain then wanted any of the benefits of the single market, it would still have to observe most of the EU's rules (as Norway does today).

**Angela's ashes**

In her memoirs, Mrs Merkel might well say that Mr Cameron was to blame if it came to this. But she would have helped. In the past she resisted the idea of regular euro-zone summits precisely so as to ensure that the British, Poles and Swedes had seats at the table. By giving way now, she may soothe her voters' current anxieties about the euro, but the future price could be large. If the euro zone moves to greater fiscal and economic-policy harmonisation, it may make the entire club less congenial to liberals-and less appealing even to those in Britain (including Mr Cameron) who want to stay in.

The European project has long had at its heart a tension between an economic liberalism that favours openness to the world and an economic nationalism that prefers a fortress. *The Economist* has always been on the first side of that argument; so, usually, has Mrs Merkel. As Europe's most powerful politician, she should make clear that this week's euro-only meeting is a one-off emergency summit rather than the start of something much more permanent-and more damaging.

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Chaotic Cote d'Ivoire

# Don't forget it

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**The Arabs' turmoil must not deflect attention from other equally bloody crises**




WHILE the eyes of the world have been riveted on events in Libya, Egypt and Tunisia, a post-election stalemate in Cote d'Ivoire, once the jewel of west Africa but now a byword for bloody chaos and division, has been getting nastier by the day (see article). More than 400,000 Ivorians have fled their homes, three-quarters of them from Abidjan, the country's once shinily prosperous commercial capital, most of them in the past few weeks. Hundreds have been killed, mainly by the forces of Laurent Gbagbo, the former president who has refused to step down after being roundly defeated by his challenger, Alassane Ouattara, at the polls in November.

On March 3rd Mr Gbagbo's men gunned down seven unarmed women in Abidjan, who had been peacefully protesting against him. That atrocity incurred worldwide opprobrium. But too few people in such bodies as the UN Security Council seem to care-or be minded to get rid of him. Events in Libya must not be allowed to let Mr Gbagbo stay in power by getting away with murder.

Moreover, the longer he lasts, the bigger the risk that other countries in the region will get sucked into the mayhem, as has happened in the past when civil strife has spread contagiously back and forth through nearby Sierra Leone, Liberia and Guinea, leaving hundreds of thousands dead and several million destitute. It is vital, for the sake of the whole continent, that all international bodies, especially African ones, keep up the pressure against Mr Gbagbo to make sure that he goes.

As *The Economist* went to press, the African Union (AU), which is supposed to prevent such horrors from occurring among its own members, was pondering its next move. Three types of pressure can be applied: economic, diplomatic and military. At present the most effective is economic. The seven other countries of the west African franc zone have suspended Cote d'Ivoire from participation, so Mr Gbagbo is running out of cash. The European Union and the United States have imposed economic sanctions. He has lost his biggest trading partners, since it is virtually impossible for him to export the country's cocoa or coffee, its economic mainstays.

But, alas, he is not yet friendless. Some misguided members of Africa's self-regarding club of "big men", such as Angola's oil-rich Jose Eduardo dos Santos, dislike the idea of their peers being ejected peacefully at the polls after many years in office. They are thought to be quietly helping him. Zimbabwe's Robert Mugabe has, by one account, been sending him arms.

**Losers must not be allowed to hang on**

This year nearly a score of presidential or parliamentary elections or referendums have been scheduled among the 53 members of the AU; some have already been held, with mixed results. Most of them are in sub-Saharan Africa, where, despite many setbacks, a record of competitive and pluralistic politics has been notably better than in the Arab world, especially in the past two decades.

Yet the AU must resist its tendency to allow bad losers to stay on by endorsing governments of bogus national unity. In recent years it has let that happen in Kenya and Zimbabwe, where the winning side was prevented from properly taking power. It is essential that Africa as a whole gets used to the idea that ruling parties bow out when they are rejected at the

ballot box. So-called unity governments, installed with the apparently good intention of preventing further chaos after blood has already been shed, are as likely to lead to paralysis and patronage as to creative compromise. It would be a shockingly bad omen if Mr Gbagbo somehow hung on in any guise whatsoever in Cote d'Ivoire.

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Regional disparities

# Gaponomics

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**Regional income inequality has risen in many countries. What should be done about it?**




WATFORD GAP is geographically unremarkable but culturally iconic. The small dip between two hills in Northamptonshire is home to a motorway service station and marks the unofficial boundary between the north and south of Britain. In the popular stereotype, life on the other side of the Watford Gap is as foreign as life in a distant land.

That may not be far from the truth. An analysis by *The Economist* shows that regional income disparities have widened in several rich countries during the recession (see article), and are particularly big in Britain and America. The gap between Britain's poorest regions (mainly in the north and Wales) and its richest (in the south-east) has widened for the past 20 years. It grew worse during the recent recession, and is likely to widen again as government budget cuts fall disproportionately on poorer regions. GDP per head in the poorest quarter of Britain's regions is now lower than in the richest part of China.

Does this matter and, if so, what should be done about it? To most politicians the answer to the first question is self-evidently yes. "Slipping behind Shanghai" is hardly a vote-winning slogan. And all too often the answer to the second question has involved subsidies. The European Union's "structural funds", more than a third of the EU's budget, are designed to shift cash from richer to poorer parts of the single market. America has pumped federal dollars into deprived regions such as Appalachia. Now Britain's coalition government is dusting off Thatcherite ideas for boosting left-behind areas with tax breaks: on March 5th George Osborne, the chancellor, announced the creation of ten "enterprise zones" that will get preferential tax treatment and simplified planning rules.

**People not places**

Unfortunately, the record of such regional-development efforts is poor. Despite massive transfers, the gap in economic vibrancy between Italy's richer north and its poorer south is still huge: only 40% of people in Calabria have a job, compared with 65-70% in Lombardy and Bolzano. Even policies that, in principle, should be helpful, such as improving infrastructure, are no panacea. West Virginia has masses of roads, but is still poor. And good intentions can backfire:

"enterprise zones" and other regional tax incentives often shift jobs away from places that don't get the subsidy, rather than create new ones.

Instead of obsessing about revitalising lagging regions, politicians would do better to focus on the people within them. A region's prosperity is determined by its inhabitants' productivity and thus by people's skills, the scale of capital investment and the pace of innovation. These are bound to vary across regions. Cities are more productive than rural areas. But not all cities are equal: the characteristics that helped Manchester and Liverpool prosper in the 19th century, such as proximity to cotton mills and the sea, are less useful in the 21st century, when Britain's strengths-in finance and other skilled services-decisively favour London and the south-east.

This points to a different set of policies. First, make it easier for people to move. Given inherent gaps in regional productivity prospects, there is a case for boosting mobility from declining regions to prospering ones. In Britain the main problem is the fetish for home-ownership and high house prices in the south-east, partly the result of severe shortages of supply. Easing planning restrictions below the Watford Gap would be a better way of helping Britons than propping up the north.

Second, focus on education. In Sunderland only 21% of adults have any form of higher education, compared with 39% of Londoners. Though there are other ways that the British government can help boost productivity-from strengthening infrastructure to cutting red tape-the single biggest reward will come from improving northerners' educational performance. To be sure, the better-educated might then move. But they, and Britain as a whole, would be much better off.

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Corruption in India

# A rotten state

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**Graft is becoming a bigger problem-and the government should tackle it**



INDIANS' anger over rising corruption has reached feverish levels. What people are calling a "season of scams" includes the alleged theft of billions by officials behind last year's Commonwealth games in Delhi; $40 billion in revenues lost from the crooked sale of 2G telecoms licences; and over $40 billion stolen in Uttar Pradesh alone from schemes subsidising food and fuel for the poor. Foreign businessmen, who have slashed investment over the past year, rank graft as their biggest headache behind appalling infrastructure. Now India's anti-corruption chief has been forced out over, well, corruption (see article).

Graft is hardly new in India: the Bofors scandal brought down the government in 1989. But there seems to be more of it about than ever, if only because India is getting richer fast, and the faster the economy grows, the more chances arise for mind-boggling theft. The government says that in the next five-year plan period, which starts next year, $1 trillion will be spent on roads, railways, ports and so on, with billions more on re-equipping the armed forces and welfare. Add in an insatiable appetite for scarce land, water and minerals and a monsoon of bribes is forecast.

Some are inclined to shrug their shoulders. After all, corruption does not seem to be stopping India from growing. Yet imagine how much better the country would be doing without it. Corruption raises costs not just to Indians, but also to the foreigners whose capital India needs. Thanks in part to those scandals, India's stockmarket was the worst-performing outside the Muslim world over the past year.

To its credit, the government has begun to take action against powerful individuals. Maharashtra state's chief minister was forced out over a property scandal. Police have quizzed Suresh Kalmadi, the politician who ran the Commonwealth games. Most strikingly, Andimuthu Raja, the cabinet minister who oversaw the 2G telecom licences, was arrested.

A 2005 act giving the right to information is welcome, as are auctions for public goods, such as last year's lucrative sale of the 3G telecom spectrum. Technology is helping. In some states, bids for state contracts are being run online, allowing anti-corruption bodies to monitor them. Gujarat does this for all contracts over 500,000 rupees ($11,000). It also puts land records and death certificates online, cutting down on one form of petty graft. Websites, led by ipaidabribe.com, reveal the cost of graft by publicising the sums demanded for everything from registering a baby to fixing a broken water supply.

The central government should now implement a plan for a universal, computerised ID scheme. It would allow welfare payments to be paid into individuals' bank accounts, hindering theft by state workers.

**The licence Raj lives on**

Most of all, India must redouble its efforts to liberalise. The state could outsource official tasks, cut red tape and sell wasteful and corrupt state-owned firms (why does the government make watches?). For all that the "licence Raj" was supposedly scrapped two decades ago, it can still take nearly 200 days to get a construction permit and seven years to close a business. Regulations are not, by and large, deterrents to corruption, but a source of it.

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Letters

## On inflation, debt ratings, the Middle East, unions, history, Iran, the moon, road carriages, Alan Clark

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Letters are welcome via e-mail to letters@economist.com

## Inflation in China

SIR - Your Economics focus column of February 19th fell victim to the higher-inflation-is-okay-if-you're-Chinese-and-unbalanced bug. It seems to be doing the rounds. I would recommend the following course of treatment. First, ask the 1.3 billion Chinese if more inflation or higher property prices are welcome. Not all wages are rising. Consumer confidence has taken a knock for a reason. Second, recall that most folk here have no way to protect themselves against inflation, given persistently negative real interest rates at the banks.

Third, reflect again on why a structural shift in the labour market should necessarily lead to more inflation. We believe it should not. Potential growth falls with slower labour growth. Inflation occurs when an economy grows above potential. And fourth, recognise that the authorities have missed their soft 3% inflation target in three of the past four years, so imagine what a higher target would do, including to house prices.

Higher inflation will cause China's real exchange rate to appreciate, but it will also cause no end of other troubles. The boring, difficult and conventional medicine-less intervention in the foreign-exchange market, nominal appreciation and higher real interest rates-is still the best option.

Stephen Green
Regional head of research
Standard Chartered Bank
Shanghai

## Rating ratings




SIR - You were wrong to suggest that sovereign-debt ratings have performed poorly ("Downgrading expectations", February 26th). On the contrary, they have a strong record as benchmarks of credit risk. Since 1975 an average 1% of sovereigns that were rated investment grade by S&P have defaulted on their foreign currency debt within 15 years, compared with 29% of those in the non-investment grade category. A study published in October 2010 by the IMF found that ratings provide a robust ranking of the risk of sovereign default and noted that all sovereigns that have defaulted since 1975 had speculative-grade ratings for at least one year before they defaulted.

Your claim that downgrades "amplify procyclicality" is also wide of the mark. Ratings are not instruments of prudential regulation; they are independent opinions of creditworthiness based on fundamental analysis and therefore should be expected to change as credit risk evolves over the cycle. They are, nonetheless, much more stable than bond prices and spreads on credit-default swaps, which are driven by many factors other than creditworthiness.

That stability is amply demonstrated by the behaviour of the euro-zone government-debt market over the past decade, which has veered from extreme complacency to extreme fear about credit risk in the region. Ratings of euro-zone periphery sovereigns, by contrast, reflected a much less positive view during the boom years and in many cases now reflect a significantly less negative view than the market about default risk.

David Beers
Global head of sovereign ratings
Standard & Poor's
London

**Arab riches**



SIR - Another aspect to add to your thoughts on the role of oil in propping up tyrants in the Middle East is that the wealth from oil has been spread very thinly among the population ("Blood and oil", February 26th). As the old political systems crumble, so should the old economic systems. These would-be democracies should draw up plans so that all their citizens share in the wealth from oil; creating a wealth-owning middle class would help secure a more stable future. The Norwegian model is a good example.

Andres Drobny
Drobny Global Advisors
Los Angeles

SIR - Simplistic as it may seem, the collapse of dictatorships could be a matter of simple city geography: the availability of large public squares for people to congregate and take control. Like the convergent flows of a tsunami, the waves of crowds calling for democracy gained momentum in Tunis's November 7 Square and Cairo's Tahrir Square. The control of public squares seems paramount; Muammar Qaddafi has addressed his supporters in Tripoli's Green Square.

Although the beginning of a people's democracy can start in cyberspace you still need real space for it to happen.

Poh Poh Wong
Singapore

**A salary package**

SIR - Regarding your leader on the fight over union power in Wisconsin, I am surprised that although *The Economist* understands the principle of getting what you pay for when the topic is executive pay, when it comes to unions the notion is abandoned ("Showdown in Madison", February 26th). Schools need talented teachers, who are expensive. This seems like a wise investment.

Kevin Foster
Associate professor of economics
City College of New York

SIR - You did not mention Governor Scott Walker's cut in corporate tax and its effect on Wisconsin's budget deficit, nor write about the influence of his political benefactors, the anti-union Koch brothers.

Zoe Wolff
Trenton, New Jersey




SIR - You lauded "the fight to bring a little private-sector discipline to America's public sector". Tucked away inside the back cover of the same issue you had a chart showing that Wall Street firms paid $20.8 billion in cash bonuses in 2010 and $22.5 billion in 2009 (Economic and financial indicators). These same firms would not be solvent today without the government injecting hundreds of billions of taxpayer dollars into the financial system.

Is this the sort of private-sector discipline you have in mind for teachers?

Terence Edwards
San Francisco

**Let bygones be bygones**

* SIR - I disagree that an apparent lack of knowledge about past events is a problem for Americans ("Don't know much about history", February 19th). It strikes me that the bitter memory of historical events is a big factor behind most conflicts. This is true for Muslims and Jews in the Middle East, once-massacred Armenians, ethnic tensions in the former Yugoslavia and extremists determined to punish the United States for its past transgressions in the Arab world.

Perhaps the relaxed attitude of Americans towards history is simply a sign that we have mostly moved on from our broiling conflicts, notwithstanding the effort by tea partiers to stir up historical clashes in order to stoke discontent.

If the American working class had remembered that it is still only less than 100 years ago that businessmen used machineguns against their workers in industrial disputes, the fight to weaken union power might have been a lot more visceral. Best to let sleeping dogs lie.

Michael Link
Boulder, Colorado

**The People's Mojahedin Organisation of Iran**

* The claim that the People's Mojahedin Organisation of Iran (PMOI) took part in the suppression of Kurds and Shiites in 1991 is a great lie and its publication on one of the *The Economist*'s blogs violates the principles of journalism and has a clear political agenda.

This claim was first made by intelligence organs of the mullahs' regime and published in its affiliated media, and it continues to be a serious part of Tehran's demonisation campaign against its main opposition force. The WikiLeaks revelations, published by the Daily Telegraph on February 4th, exposed one such front organisation of the mullahs'

Intelligence Ministry called "Nejat" Association which approached British government agencies and officials to propagate such lies against the PMOI.

Continue reading this letter...

**The sun and the moon**



SIR - As an astronomer I scratched my head over a letter (March 5th) in which a reader suggested a mnemonic using your hands for distinguishing between a waxing and waning moon. He did this to point out your apparent incorrect caption of a waxing moon in Rio de Janeiro. Unfortunately, his mnemonic would only work in the northern hemisphere, where the moon is observed in the southern sky with the right side of the moon sunward during the waxing phase and the left side sunward during the waning phase.

In the southern hemisphere the moon is in the northern sky and its left and right sides reverse. *The Economist* can take solace that the original picture showing the waxing phase on the left side of the moon in Rio was indeed correct.

John Nousek
Boalsburg, Pennsylvania

* SIR - The letter helpfully pointed out the way to tell a waxing from a waning moon: extend the right arm then the thumb and index finger to illustrate a waxing moon and do the same with the left hand to illustrate a waning moon. That is correct, assuming that those observing the moon in the southern hemisphere do so standing on their heads.

David Woodward
Abu Dhabi

* SIR - The failure to appreciate the inverted view of astronomical objects caught out the BBC several years ago during a live broadcast from Australia of the transit of Venus across the Sun. After an embarrassing delay when Venus failed to appear at the precisely predicted time at the top-left hand edge of the Sun, someone noticed that Venus had in fact appeared at the bottom right-hand edge, resulting in a hasty re-adjustment of the camera.

Chris Brookings
Collyweston, Northamptonshire

**Vehicular assault**




* SIR - You dated the first fatal accident with a car, or horseless carriage, as occurring in London in 1896 ("Safety first", February 4th). In fact, the first such accident happened in Birr, Ireland, in 1869 when Mary Ward, a botanist, was thrown from Lord Rosse's steam-powered road carriage and then run over by it. Ward and Queen Victoria were the only two women of their day who were sent advance copies of papers published by the Royal Society, an indication of her stature in science. She is the only person buried in the Rosse vaults who is not a member of the family; her family refused the return of her body, saying to Rosse, you killed her, you bury her.

Malcolm Ross-Macdonald
Birr, Ireland

**One-upmanship**




SIR - Your extension to the well-worn phrase that an Englishman's home is his castle "and castles need furniture" ("The secret of IKEA's success", February 26th) brought to mind the late Alan Clark. His remark that Michael Heseltine, a parliamentary colleague, was the kind of man "who bought his own furniture", was felt by a Tory peer to be "a bit rich coming from a person whose father had to buy his own castle".

Caroline Fiennes
London

* Letter appears online only

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The Arab uprisings

## Democracy's hard spring

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**Once the protests are over, institutions need building up-often from scratch**



AS A dramatic revolutionary moment, the storming of Egypt's notorious State Security Investigations Directorate (SSI) seemed to rank with the fall of the Stasi headquarters in East Berlin in 1990. Over the first weekend in March furious crowds surged into the imposing bureaus of the secret police in half a dozen Egyptian cities. At their sprawling main complex in a Cairo suburb, some gleefully hunted for documents and computer discs. Others searched for hidden dungeons, shouting into air vents and frantically prising up floor tiles in the hope that long-missing relatives might be found underground.

Yet the buildings were largely empty, their floors deep in drifts of shredded paper. The SSI had not only withdrawn its own men, emptied its prisons and destroyed archives; among documents that did leak onto the internet, some appeared to be plants designed to throw up a smokescreen. One, for instance, contained the scarcely credible revelation that a son of Hosni Mubarak, Egypt's fallen president, had sponsored a series of terrorist bombings in revenge for failing to secure a cut in a lucrative deal to sell natural gas to Israel.

In East Germany the people were luckier. Most of the Stasi archive was saved. Unification with West Germany soon allowed for an orderly transition to a fair and open political system. For Egypt and other Arab countries in the throes of revolution or on its verge, overhauling the ship of state will be much more difficult. Not only are institutions such as the secret police hard to clean out; there is also no ready model for an open, democratic Arab society, whether republic or constitutional monarchy. Bits may be borrowed from the manuals of other democracies, but much will need to be invented from scratch.

Tunisia and Egypt, the region's revolutionary pioneers, are already running into turbulence. The core of activists who mobilised their revolutions have been joined by motley groups pursuing narrower agendas, ranging from higher wages to women's rights to the imposition of sharia law, and to demands that other demonstrators stop protesting. Criminality is on the increase, as ordinary police have been slow to return to the streets. Businessmen protest that attempts to prosecute former officials and their cronies for corruption have broadened into witch hunts that frighten off investment. Purges continue in universities, government agencies and state-owned industries, where officials implanted by the former ruling parties and security agencies now face open revolt.

Pre-revolutionary social ills are also resurfacing. In Egypt, where the revolution featured heartwarming scenes of cohesion between Muslims and the 10% Coptic Christian minority, sectarian clashes have again erupted, with at least 13 killed in

riots on the outskirts of Cairo. The fatal stabbing of a Polish monk in the Tunisian capital on February 18th was ascribed by some to Islamist radicals. Others blamed renegade policemen bent on implicating Islamists and maintaining a state of fear.

Aside from such surface troubles, deeper problems have emerged. Their source is not just the shakiness of both countries' interim governments, which have largely been purged of ministers associated with old ways and are now led by fresh, untainted prime ministers. Debates rage over whether to scrap the old constitutions immediately or to reform them temporarily, whether to push for early elections or hold off until rules are set and the playing field levelled, and whether to opt for presidential or parliamentary political systems. Such essential questions as the proper relation between religion and the state, and between central and local government, remain to be resolved.

In Egypt, where such debates are more intense and better reflected in a broader, more mature press, some progress is being made. The army high command that assumed overall control after Mr Mubarak's overthrow sketched a basic political road map early on. They appointed an expert panel to revise the constitution so as to allow for fairer presidential elections in six months' time. Egyptians are set to vote yes or no to a package of revisions on March 19th. Should this pass, and a new president be elected, he would then be "invited" to oversee more sweeping constitutional changes. These could include a reduction of the regal presidential prerogatives enjoyed by Mr Mubarak, more independence for the judiciary and a stronger legislature.

**How far, how fast?**

So far the military men have not shifted from this plan, but a chorus of doubts is growing. Some point to the absence of guarantees that a new president would agree to surrender powers. Others say that too fast a transition would strengthen existing parties, particularly the Muslim Brotherhood and the remnants of Mr Mubarak's corruption-riddled National Democratic Party, at the expense of newer groupings. Among intellectuals and the core of revolutionary activists there is wide agreement that a longer transitional period is needed. They want the army to appoint a temporary ruling executive council, charged specifically with setting up a body to draft a completely new constitution. This would set the rules for both parliamentary and presidential elections.

To general surprise, the army has proved responsive to protesters' demands so far. Senior officers have had regular meetings with a range of opposition leaders, and at their urging removed the last prime minister appointed by Mr Mubarak. In a gesture to the Facebook generation, the army has set up its own page, and uses it to broadcast its views. Soldiers have largely allowed protests to continue, and at first stood aside to let citizens invade secret police offices. To back down on the constitutional referendum, however, might be viewed as showing too much flexibility.

Already there are signs of stiffening. Calls to dissolve the SSI, as Tunisia recently did with its similar secret-police organisation (even announcing the move on Facebook) have so far been rebuffed. Soldiers now guard its offices, and the army has demanded the return of all missing documents. It has tightened the midnight curfew in Egypt's main cities. On March 9th soldiers forcibly removed a remaining encampment of protesters in Cairo's Tahrir Square. The new cabinet also issued its first decree, setting severe penalties for the hazily defined crime of "thuggery".

Many Egyptians welcome such moves as necessary to restore stability. Egypt's new prime minister, Essam Sharaf, is genuinely popular. An expert in traffic management, he served briefly under Mr Mubarak as minister of transport before resigning. As a university professor he joined in the mass demonstrations calling for Mr Mubarak to go. On his first day in office he pointedly walked to Tahrir Square to address the crowd, promising to uphold the aims of the revolution.


Freedom's tiring

And although Egypt's broader political evolution is sure to take time, changes are already being felt. In the last decade of Mr Mubarak's 30-year rule, Egypt's privately owned press began to overtake the stodgy state-owned media. Both, however, were subject to intense pressure to convey the regime's views. State-security officers frequently reprimanded editors, or summarily banned unwanted voices from the airwaves. During the revolution, Mr Mubarak and his minister of information personally telephoned television presenters to berate them for unfavourable coverage.

The revolution has greatly emboldened Egypt's press. Private TV channels now venture into the previously forbidden realm of news coverage, and workers in the state-owned press have managed to eject editors appointed by Mr Mubarak. Mr Sharaf's briefly installed predecessor as prime minister, Ahmed Shafiq, is widely believed to have been removed after acting arrogantly on a talk show.

Another institution subject to manipulation by the security services, Egypt's judiciary, is also showing signs of greater independence. Not only is it vigorously prosecuting former officials, including Mr Mubarak and senior ministers; it has also overturned bans on some political parties. The new justice minister has also reduced his own power to appoint judges, in favour of selection by their peers.

Egypt's state universities, which account for some 90% of college enrolment, have also been convulsed by change. In the past not only their presidents, but even minor academic appointments and candidates for student unions, were vetted by security officers. Faculty and students in many institutions have now united to get rid of unwanted administrators.

The collapse of the secret police has brought relief in smaller ways. Arbitrary checkpoints on roads, which snarled traffic and humiliated drivers, have vanished. Egyptian mobile-phone operators, whose licences gave the SSI unlimited rights to snoop, now want them revised. Businesses and even government agencies that once felt obliged to hire former security officers, or contract companies owned by them, feel free to look elsewhere.

A new-found sense of freedom appears even to have infected the Muslim Brotherhood, where many of the younger members who manned the barricades in Tahrir Square now want a greater say, open internal elections and revisions to the group's political platform. Among other things, they suggest dropping the idea that a body of clerics should vet future laws.

Even without such internal pressure, the Brotherhood appears to be maturing as it ceases to be the main target of state repression. By its count, some 40,000 members were jailed during the last two decades of Mr Mubarak's rule. None remains inside, but the group has made it clear that it intends to act as a responsible and even loyal opposition. Spokesmen say it will abide by the army's commands, would accept minor constitutional reforms and does not intend to run a presidential candidate or seek a parliamentary majority.

**The wider picture**

Egypt's emerging democracy remains very much a work in progress, but already it is having a wider influence. Rebels opposed to Muammar Qaddafi in eastern Libya say they also seek to create a pluralist parliamentary democracy with reduced executive powers (see article). Islamists there, including former members of groups linked to al-Qaeda, have shown a willingness to accommodate secular views.

Yemen, embroiled in massive protests against the 33-year rule of President Ali Abdullah Saleh, has traditionally looked to Cairo for guidance and will do so again. But the template of a successful Egyptian transition to democracy will prove harder to apply in Arab monarchies. These, so far, have been more resistant to change, although pressure is mounting against hereditary rulers from Morocco to Oman, and even in Saudi Arabia.

Except in the Gulf kingdom of Bahrain, where anger among the majority Shias against the ruling Sunni royal family has intensified after a failed police crackdown on protests last month, the call in all these countries is not for the overthrow of monarchs but for constitutional limits to royal rule. If just one Arab monarchy finds a new people-empowering model that works, the rest will be pressed to follow.

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Arab economies

## Throwing money at the street

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**Governments throughout the Middle East are trying to buy off trouble. They may be storing up more**

IF YOU don't own your citizens' loyalty, perhaps you can rent it for a while. That seems to be the mantra of Arab regimes at the moment. Throughout the Middle East and north Africa, they are showering their citizens with money and gifts, like Hosni Mubarak's policemen hosing down protesters with water cannon in Tahrir Square.

Governments in the region have long controlled prices of food and fuel. If you fix domestic prices and world prices rise, subsidies will increase even if the regime does nothing. Egypt keeps bread prices at a few cents a loaf. With wheat prices soaring, Mr Mubarak promised that bread would stay cheap, raising subsidies which now run at over $2 billion a year. The new government can hardly break his promise.

Fuel subsidies are bigger. In 2009 they amounted to roughly $150 billion in the Middle East and north Africa. Oil then cost just over $60 a barrel. It is now almost double that, so if prices were to stay at the same level regional fuel subsidies would rise to almost $300 billion this year. That is 7.5% of the area's GDP, a vast amount. The only way to prevent such a jump would be to increase domestic fuel prices. But no countries have been brave enough to risk that except Qatar and Iran.

**Subsidies for peace**

New spending measures, selected countries, 2011

| | | Budget balance, % of GDP* | Import cover, months*† |
|---|---|---|---|
| Algeria | $156bn on new infrastructure projects; tax cuts on sugar | -3.5 | 38.0 |
| Bahrain | $100m to families; proposal for $2,500 for each family | -0.1 | 3.6 |
| Jordan | Salary increase for civil servants and military personnel; tax cuts on fuel and food; more money to National Aid Fund for the poor | -8.4 | 9.2 |
| Kuwait | $4,000 for each citizen; free food for 14 months | +24.4 | 9.4 |
| Libya | $450 for each family; 150% wage increase for some public-sector workers; abolition of taxes and customs duties on food | +8.9 | 42.5 |
| Morocco | "Compensation system" for wheat importers | -4.3 | 7.1 |
| Oman | Minimum-wage increase from $364 to $520 a month; 50,000 new government jobs; monthly stipend of $390 for job-seekers | +1.4 | 5.9 |
| Saudi Arabia | 15% pay increase for public-sector workers; unemployment benefits; affordable-housing subsidies | +6.4 | 34.2 |
| Syria | Consumption-tax cut on coffee and sugar; reduced customs duties on food; more money to Social System Fund for poor; increased wages and heating allowances for civil service | -4.5 | 11.8 |
| Tunisia | Increased welfare spending; some food-price subsidy rises | -5.0 | 5.3 |
| Yemen | Increased welfare spending | -5.1 | 6.5 |

Sources: Peterson Institute for International Economics; Economist Intelligence Unit; *The Economist*; press reports

*2010 estimates †Foreign-exchange reserves expressed as number of months of imports

Governments are not merely sitting by, watching existing subsidies shoot up. To buy off economic discontent, they are introducing new handouts (see table). The commonest is the old-fashioned wage rise. Saudi Arabia is boosting public-sector pay by 15% as part of a $36 billion spending splurge. Egypt, Jordan, Libya, Oman and Syria are all raising wages or benefits for public employees, though whether the 150% pay rise for Libyan civil servants will actually be paid is another matter. The wage increases in Jordan and Syria are worth 0.4-0.8% of GDP, which is not trivial. In addition Muammar Qaddafi of Libya, the king of Bahrain and the emir of Kuwait are offering one-off handouts to stop people demonstrating. These are princely, worth $4,000 per person in Kuwait and $2,500 per family in Bahrain.

Some governments have added shiny new subsidies. Kuwait, for example, is offering free food to everyone for 14 months. Bahrain says it will dish out up to $100m to help families hit by food inflation.

Many more are boosting social-welfare schemes. Jordan, Syria, Tunisia and Yemen have each increased the budgets of national programmes that give cash and benefits to the poor by just under 0.5% of GDP. Such programmes typically account for 2% of GDP, so the extra spending increases the size of the schemes by a quarter. A few countries have cut taxes on food or fuel to offset price rises. Lebanon, for example, has cut fuel excise tax by over 1% of GDP.

But far and away the most lavish sums are being spent or proposed by oil and gas exporters on infrastructure. Inevitably, the grand-daddy of such proposals is Saudi Arabia's. The government is talking about increasing investment by half a trillion dollars, on top of the $36 billion stimulus plan. Algeria is proposing to spend $156 billion on new infrastructure projects between now and 2014, plus $130 billion on projects already under way. Oil-flush Abu Dhabi says it will finance more infrastructure projects in the poorer princedoms that make up the United Arab Emirates. The speaker of the UAE's parliament says the state's sovereign-wealth fund should disburse a further $40 billion to stimulate the economy and cut interest rates.

**Let's worry later**

It is too early to gauge the effect of all these measures. To the regimes implementing them, the political results matter most. These look modest. Wage and subsidy rises did not save Mr Mubarak. First reactions to Saudi Arabia's spending splurge have also been dismissive, to judge by social-media sites. "They are still stuck with the old mentality: giving away

money!" said one. On the other hand, the measures may have bought time for the regimes there, and in Bahrain, Jordan and Syria.

The economic effects look clearer. Most governments probably have enough money to spend. Saudi Arabia certainly does. Each $1-a-barrel increase in the price of oil adds about $3 billion to the Saudi treasury, implying that the increase in oil prices this year could add roughly $100 billion to revenues. Saudi Arabia is also increasing oil production, so it could spend even more.

The position of oil importers is more precarious. They came through the global financial crisis with reasonable foreign-exchange reserves, falling debt-to-GDP ratios but rising budget deficits. If nothing else goes wrong, Egypt and Tunisia should be able to finance some extra spending. But their economies are suffering from an external shock from lost tourist revenues and are vulnerable to a downturn in demand: GDP growth in Egypt is forecast to fall from over 5% in 2010 to below 4% this year. Their fiscal position could deteriorate fast.

Everywhere the changes will increase the role of the state in the economy, which was too large already. They are already reversing the modest economic reforms of the mid-2000s. Then, Egypt lowered import tariffs, opened up its foreign-exchange market and cut taxes and red tape, so that by 2007 it was the top reformer in the World Bank's "Doing Business Report". Now it is 94th. Saudi Arabia also opened up, more cautiously. The massive stimulus measures will do nothing to loosen the economic grip of the House of Saud.

Most Arab regimes are fighting for their lives, in some cases literally. They have more pressing things to worry about than the economic consequences of their actions. But consequences there will be. And they may not be good ones.

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Manufacturing

## Rustbelt recovery

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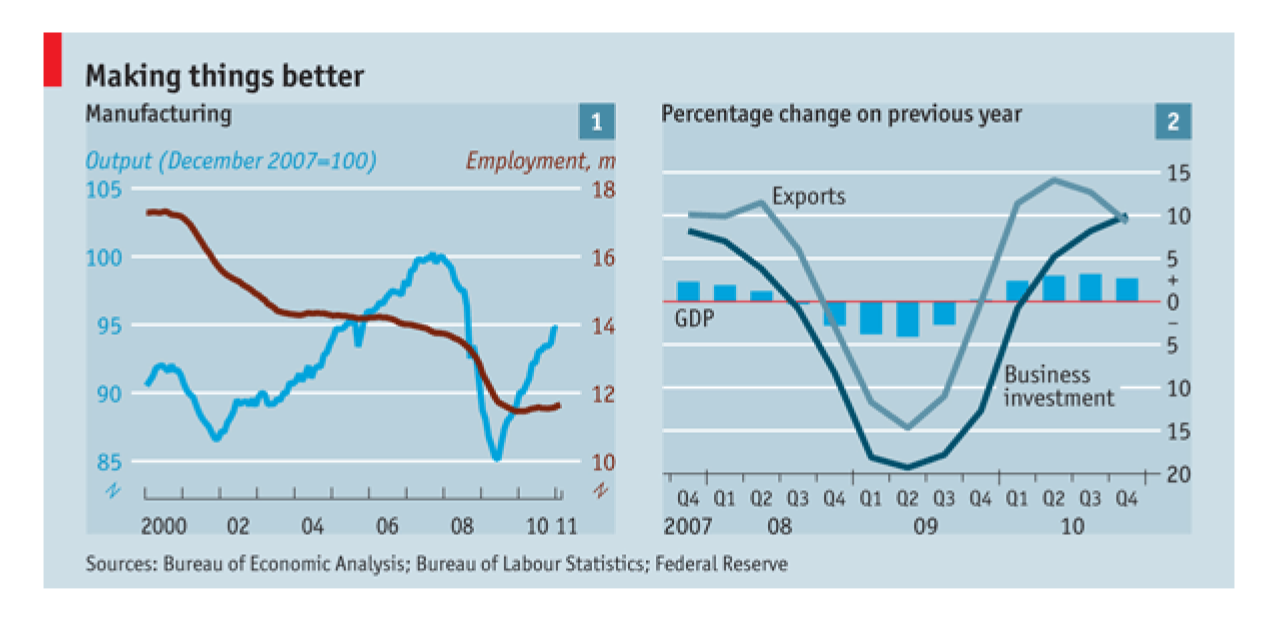
**Against all the odds, American factories are coming back to life. Thank the rest of the world for that**




ACME INDUSTRIES is a small contract manufacturer with only ten big customers. But those customers are a cross-section of the industrial economy, spanning mining, oil, transport and construction. Right now, Acme's order book is bulging. "Everyone is up across the board," says Bob Clifford, the company's head of sales and marketing.

In one corner of its factory just outside Chicago, three workers polish what looks like a steel Lego brick the size of a steamer trunk. This is designed to channel water underground at high pressure, and will go into natural-gas-drilling equipment. In another corner sit rows of hollow steel cylinders that will hold bearings inside the wheels of gigantic mining trucks being built in nearby Peoria. Mr Clifford points to several parts destined for diesel locomotives built by a subsidiary of Caterpillar a big maker of heavy equipment. Caterpillar is booming, and its ecosystem of suppliers across Illinois is "seeing a real trickle-down effect," he says.

At the nadir of the recession Acme's sales had fallen 20% and it had laid off ten of its 125 employees. Sales are back up, the head count is now up to 130, and Acme reckons it will hire 20 more people this year to handle the growing order book.



For the first time in many years, American manufacturing is doing better than the rest of the economy. Manufacturing output tumbled 15% over the course of the recession, from December 2007 to the end of June 2009. Since then it has recovered two-thirds of that drop; production is now just 5% below its peak level (see chart 1).

Factory employment has been slower to recover than output, since productivity has risen. Nonetheless, that too is growing. In February factory payrolls rose by 33,000 from January. In the past year manufacturing employment has gone up by 189,000, or 1.6%, the biggest gain since the late 1990s. Total employment rose just 1% in that period. Unemployment has fallen more sharply than the national average in Illinois, Ohio and Michigan, which are relatively dependent on manufacturing.

Much of the recovery there is payback for the stomach-churning plunge that came before. Sales of cars, still one of America's biggest manufacturing sectors, collapsed between 2007 and 2009 as customers lost access to credit, lost their jobs, or lost confidence in cars made by General Motors and Chrysler, which went through government-sponsored bankruptcy. That rippled through the industry's thousands of suppliers strung out across the rustbelt. "We were in the valley of death in April of 2009," says John Winzeler, president of Winzeler Gear, whose small plastic gears go into door latches, lumbar supports and countless car parts. Sales, down 40% during the recession, have recovered more than half that drop, in line with the recovery in car production.

Beyond this cyclical bounce-back, though, a structural shift may also be under way. Makers of floorings, furniture and glass, all of which go into houses, were especially hard hit and have yet to start hiring again. But those that make things for businesses or customers overseas-computers, machinery, electronic equipment, heavy-duty trucks-are thriving. Cisco Systems and Intel Corporation notched up record sales last year. Caterpillar and John Deere, which makes diggers, bulldozers and farm equipment, saw sales leap.

Kash Mansori, who provides economic consulting for manufacturers, attributes this to the composition of economic growth (see chart 2). Housing and car sales have typically led previous recoveries, but this time both have been held back by tight credit conditions and heavy household debt. Meanwhile business investment, typically a laggard, is rising because of tax incentives and because firms had so long delayed replacing ageing equipment. Exports are even stronger, thanks to the robust appetites of emerging markets and a lower dollar.

In its Economic Report of the President last month, Barack Obama's Council of Economic Advisers calculated that each additional percentage point of another country's growth boosts its imports from America by three percentage points. It thus expects emerging economies, including Mexico, to account for 71% of America's export growth from 2009 to 2014-especially in farm products, aircraft, integrated circuits and oil- and gas-field machinery.

Some hope this marks a broader turning point. American manufacturing employment peaked in 1979 and has been generally falling since. This was mostly because of rising productivity; but it also reflected the steady loss of domestic market share to foreign imports, especially from China. Some now wonder if those trends have stopped. Mr Winzeler points to announcements of Japanese and German companies opening plants in America. His own company has weaned itself off American car brands by developing relationships with foreign-owned suppliers.

Yet the notion that jobs may flood back from abroad seems a fantasy. Caterpillar added 19,008 employees (excluding acquisitions) last year; 60% of those were overseas. Like most multinationals, Caterpillar prefers to produce where it sells. Last year sales to Asia rose 43%, and to Latin America 58%, compared with 30% for North America. As long as emerging markets are growing fastest, that's where the bulk of new manufacturing jobs are likely to go.

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Disability payments

# The elephant in the waiting-room

**Politicians are ignoring a big, dysfunctional programme**




It only hurts when I work

THOMAS SCULLY has a busy law office in Lake County, Indiana. He mainly practices disability law, with good reason. Lake County is home to steel mills. Workers have aching backs and hands warped by machinery. Mr Scully helps them win Social Security Disability Insurance (DI), which provides cash and, after two years, access to Medicare, government-subsidised health insurance meant mainly for the elderly. DI is not supposed to be a safety net for the jobless. "I tell clients", Mr Scully explains, "disability insurance is not unemployment insurance." But they should be forgiven for being confused.

Politicians like to deride expensive programmes. DI may be the least discussed and most muddled. The programme is severely strained. The number of awards has spiked in the downturn, rising 28% since 2007. This surge follows decades of growth. DI accounted for about 10% of Social Security spending in 1989 but 18% by 2009. This is not because beneficiaries are bending any rules; the real problem is that the rules are a mess.

Congress created DI in 1956. Since then physical labour has become less common, while medical technology has advanced. One might have thought that DI rolls would shrink, but the opposite has occurred. Even compared with the Social Security Administration's other costly programme for the disabled, DI is huge. Supplemental Security Income (SSI), which gives help to the very poor, doled out $43 billion to adults and children in 2010, up 124% since 1990. DI gave $110 billion to disabled workers, up almost 420%.

The reasons for this are debated. States have an incentive to keep their welfare rolls low, so they may be pushing workers towards the federally funded SSI and DI programmes, argues Nancy Shor of the National Organisation of Social Security Claimants' Representatives, a lawyers' group. But unlike SSI, DI is not a substitute for welfare; DI requires beneficiaries to have worked for five of the past ten years.

Ageing would seem another obvious explanation, as those aged 50-64 account for almost 60% of DI awards. But the rolls grew quickly even when the share of 50- to 64-year-olds was steady, according to David Autor of the Massachusetts

Institute of Technology and Mark Duggan of the University of Maryland. Obesity does not seem to be the main cause either. Beneficiaries claiming problems such as diabetes and heart disease comprised a sliver of the awards in 2009.

A more likely culprit is the programme's structure. Messrs Autor and Duggan show that DI awards have become more attractive to those struggling in the labour market. Those awards, meanwhile, have become more accessible. In 1984 Congress made it easier for DI applicants to claim mental illness and musculoskeletal disorders such as back pain-both inherently subjective ailments. In 2009 these two conditions accounted for 22% and 31% of DI awards, respectively, about double their share in 1981. Even if an applicant does not meet DI's basic medical requirements, he may eventually win payments for other reasons. DI's rules, for example, allow an older worker unlikely to retrain to get benefits instead. Persistent applicants can seek the help of lawyers. Of those who appeal their case to a judge, almost 90% are successful.

Given DI's design, it should come as little surprise that enrolment jumps during recessions. Till von Wachter of Columbia University offers three explanations. First, impaired workers may be among the first to be sacked. After they are laid off, they may find that they qualify for DI, as is the case for many of Mr Scully's clients. Second, DI's criteria explicitly include economic factors, such as the ability to retrain. Third, those desperate for cash may use more subjective criteria, such as mental illness and "bad back", to try to win benefits. Many will fail, but they can appeal.

The Social Security Administration has tried to fix some of these problems. The "ticket to work" programme, for example, is intended to help DI and SSI beneficiaries get jobs. But as of November 2010, just 2.4% of those offered job help actually received it (let alone found work). A newer pilot also encourages those on the rolls to find jobs. Such programmes seemed doom to fail, trying to convince beneficiaries that they can find work after they have spent years arguing otherwise. More effective, says Richard Burkhauser of Cornell University and the conservative American Enterprise Institute, employers should be given incentives to accommodate workers at the onset of their disability. A separate plan by Messrs Autor and Duggan, for the centre-left Hamilton Project, calls for all employers to offer disability insurance.

A solution is needed, and soon. The DI trust fund is expected to dry up in 2018, 22 years before the trust fund for Social Security retirees does. Nevertheless, budget hawks have flown over the issue. Barack Obama's deficit panel said proposals to reform DI would be "critical" but were "beyond the scope of this commission." Last year Paul Ryan, a Republican congressman, presented a bold plan for reforming entitlements. Of DI, the plan said simply: "disability benefits will see no change."

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Public-sector unions

## Time for second thoughts?

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**A backlash against Republican attacks may be under way**



Walker may have overreached

IT IS hard to get away from the subject of union rights in the Midwest these days. Protesters agitating against moves to curb them could be heard booing and chanting throughout the "state-of-the-state" speech delivered this week by John Kasich, the new Republican governor of Ohio. In nearby Wisconsin, the also-new Republican governor is under heavy fire for having, on March 9th, used a procedural dodge to force through a bill that will strip public-sector unions of their right to collective bargaining: Democratic state senators had tried to frustrate him by fleeing across the state line to Illinois. In Indiana, the state legislature is paralysed too, after its own Democratic flight. Both sides see ramifications for national politics-but do not agree, naturally, on what they will be.

Unions argue that the hullabaloo has done wonders for their cause. "We've never seen the incredible solidarity that we're seeing right now," said Richard Trumka, the head of the AFL-CIO, America's main umbrella group for unions, earlier this month. But the union's foes say much the same thing. Tim Phillips, the boss of Americans for Prosperity, a small-government pressure group, says that he and his colleagues encountered enthusiastic crowds everywhere they went during a 12-city tour of Wisconsin in support of the proposed checks on the state's public-sector unions.

Both sides could be right, points out Andy Downs of IPFW, a university in Indiana, in that both may be rallying those already sympathetic to their cause. But the true test of the row's impact, in his view, is the response of moderate, independent voters. In that respect, most polling suggests that Democrats fighting the erosion of union rights have an advantage over the Republicans advocating it. Voters seem to dislike the idea of depriving public-sector unions of collective-bargaining rights, as the Republican governor of Indiana has already done and his counterparts in Ohio and Wisconsin are proposing. Although they tend to support the idea of cutting benefits for government employees, that stance does not appear to rest on a broader animosity towards public-sector unions, and certainly not towards the teachers, police, and firemen they represent.

Scott Walker, the governor of Wisconsin, has seen his ratings fall since the uproar in his state began, especially among independents. Some of his fellow Republicans in the legislature are beginning to edge away from his insistence that scrapping collective bargaining for state workers is non-negotiable. By the same token, proponents of a similar move in Ohio had to turf two reluctant Republicans out of the relevant committees in the state Senate to secure its passage. In Indiana, Mitch Daniels, the governor, who is thought to have presidential ambitions, has asked the legislature to put off consideration of a bill that would end mandatory collection of union dues from pay-cheques.

Amy Hanauer of Policy Matters Ohio, a left-leaning think-tank, sees hope for Democrats in all this. Support for the party among working-class voters has been unreliable in recent years, she says, thanks in part to their conservative stance on social issues. By contrast, union rights, she believes, are a subject on which Democrats and the working class can agree. It was a plunge in support among the white working class, along with low turnout among youth and minorities, which earned the Democrats their drubbing throughout the Midwest at last year's mid-term elections. The current furore should help reverse both trends, she thinks. That, in turn, could improve Barack Obama's chances in a clump of states critical to his re-election.

But Mr Downs of IPFW is more cautious. Voters, he says want to see the melodrama end. It is not yet clear how the Democrats in Wisconsin will respond to Mr Walker's latest move. But if their party, there and elsewhere, is seen to be the main obstacle to agreement, their defence of the unions could backfire. Midwesterners are looking forward to a change of subject.

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The Catholic church

# Sins of the fathers

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**The archdiocese of Philadelphia suspends 21 accused priests**

ASH WEDNESDAY is the first day of Lent, a season of penance and reflection. Fitting then that on March 8th, the day before it, the Catholic archdiocese of Philadelphia faced up to its own transgressions and put on administrative leave 21 priests accused of sexually abusing minors. The mass suspension, thought to be the largest of its kind, follows a grand jury report issued last month by the Philadelphia district attorney's office. The report revealed that as many as 37 priests accused of inappropriate behaviour around children or sexual abuse of minors were still in active ministry even after the archdiocese learned of the allegations.

The report outlined some of the sordid acts perpetrated by priests and how the archdiocese endangered the welfare of children by neglect. "Billy", a ten-year-old boy, was in effect "shared" by at least two priests who raped and abused him a decade ago. Four years earlier, one of the priests had been secretly sent to a sexual-offender treatment centre run by the archdiocese. He was released on condition that he had no contact with adolescents. But he was assigned to a parish with a school and later assigned to another school, where he raped Billy. Many Philadelphia parishioners think the administrators who swept everything under the rug are just as guilty as the abusers.

A week after the critical report was released the archdiocese hired Gina Maisto Smith, a former child-abuse prosecutor, along with a forensic psychiatrist to conduct a review of the 37 cases. Cardinal Justin Rigali, who heads the archdiocese, suspended the 21 priests on March 8th on Miss Smith's recommendation; they were to be named to their parishes on Ash Wednesday. Cardinal Rigali has said he is truly sorry for the harm done to the victims, which he described as a "great evil". He vows openness and continued co-operation with the district-attorney's office, which is investigating the allegations.

Philadelphia's faithful are shaken. James Dailey, a Catholic dad, wonders whether his children will be safe at a school where they could come in contact with priests who have not been properly screened. Catholics had been shocked by a grand-jury report in 2005 that condemned the church for ignoring or dismissing complaints against 63 priests in the archdiocese. The Philadelphia allegations are only the latest in a long line of charges that have rocked the church for a

decade, causing crowds to leave already emptying pews. Eight dioceses, most recently Milwaukee, have filed for bankruptcy because they have been besieged with lawsuits related to sexual abuse.

Cardinal Rigali has invited the faithful to join him in Philadelphia's cathedral on March 11th for a penitential service. The purpose of the service, he wrote in his Lenten letter, is "the forgiveness of all sins and...reconciliation with God and in the community." But for the long-ignored victims of abuse, prayers and suspensions are not enough. The Survivors Network of those Abused by Priests (SNAP), a vocal victims' group, noted cynically that it took two harsh grand-jury reports and four indictments to get a "prince of the church to finally temporarily take more predator priests away from kids."

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Ghosts in Kentucky

# Genteel spirits

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**The spectral residents of America's most haunted neighbourhood**




ONE evening in 1918 a Louisville belle paced anxiously on the front steps of the First Church of Christ, Scientist, waiting for her lover, a soldier stationed at a nearby camp. When he did not come she believed herself spurned; in fact, he lay in his barracks, quarantined and dying from Spanish flu-the same disease that killed the young woman days later. Some say she can be seen of an evening pacing there still.

Then there is Avery, who haunts an ornate pink house that housed both a chapter of the Women's Christian Temperance Union and allegedly (not at the same time) a brothel. He appears to warn inhabitants of impending doom. He supposedly saved one inhabitant from immolation in a kitchen fire and another from having her head crushed by a cinderblock thrown through the window. Not far away, at the Conrad-Caldwell House Museum, the ghost of Mr Conrad, who built the mansion, has been known to appear wagging his finger at stragglers who wander off from tour groups.

At 48 square blocks, Old Louisville is one of America's largest historic districts, and has a reputation as one of the most haunted. It abounds in brick and stone Victorian-era mansions. With their ornate turrets, spires, gabled windows and forbidding facades, many of them certainly look haunted. And given their age and size, most of them must have had people die in them at some point.

As for what to do with a haunted house, that varies; running out the front door screaming is one option, but you can also get to know the spook in question. David Domine, who writes about Old Louisville's history, said that the ghost haunting his house quietened down as soon as he learned that her name was Lucy and she was a maid. He sold that house to a ghost-fancier precisely because it was haunted.

And there are plenty of ghost-fanciers: around 5,000 people a year take Mr Domine's tours, around half of those from out of state. Chris Morris, the master distiller and resident historian for Brown-Forman, which makes several Kentucky bourbons (including Woodford Reserve, whose distillery is home to two ghosts), notes that Kentucky was largely settled by Irish and Britons, and "Celts believe in ghosts." In other words, Kentucky may abound not in restless spirits, but in people who believe in them.



Education policy

## School's out

**Cash-strapped cities threaten to close schools and fire teachers**




Out for ever

TANISH ABLE loves her daughter's teacher, but is not happy with her school. According to a leaked proposal, Dr Martin Luther King Junior Elementary in Newark's grim West Ward may soon be closed and replaced with an independent charter school. Ms Able is delighted at the prospect: "They should be in here already," she says. The plan, though still in

draft form, is said to call for some of Newark's failing schools to be phased out and others to be consolidated. Existing and new charter schools might even share buildings. As cities wrestle with falling budgets and poor results, similar things are happening across America.

Newark's school system, under state supervision since 1995, is failing its pupils. Pupil performance lags the rest of New Jersey by over 20 points. Dropout rates are abysmal; only 22% of students finish high school in the normal four years with the pass in a state exam needed to graduate. But a $100m donation to the city's schools by Mark Zuckerberg, Facebook's founder, is helping to fuel change.

Cory Booker, Newark's mayor, though not in charge of the system (it is in effect run by the state government), devoted nearly half his recent state-of-the-city address to education. "There will never be a great Newark unless there is a great public-school system in our city," he declared. He proposed a longer school day and more control for school principals as a way to improve pupils' performance. He and Chris Christie, New Jersey's governor, who wants to end teacher tenure, are working together to improve Newark's schools.

Across the river in New York City, the mayor, Michael Bloomberg, is threatening to cut 4,675 teachers from his payroll unless their unions show some flexibility and he gets more cash from the state politicians in Albany. The lay-offs would affect 80% of the city's 1,600 schools. Some schools could lose half their teachers because of a policy that requires the last teachers hired to be laid off first, regardless of merit.

New York is not alone. It is illegal in over a dozen states to lay off teachers for any reason other than seniority. The union denounced the lay-off threat, calling it a scare tactic. Mr Bloomberg is making some headway: a state Senate bill eliminating "last in-first out" (LIFO) was passed on March 1st. Unfortunately, it is unlikely even to be considered by the state Assembly.

Desperate to fill a $40m hole in his school budget, Angel Taveras, the new mayor of Providence, Rhode Island, has gone even further. Unable to eliminate seniority rules, on February 22nd he issued letters firing every one of the city's 1,900 teachers. Although most of the dismissals will be rescinded over the next few weeks, some will not, and some schools will be closed. "He is driven by financial desperation, not ideology," observes Chester Finn of the Thomas Fordham Institute, an education think-tank. Arne Duncan, Barack Obama's education secretary, is meanwhile calling for flexibility and wants the effectiveness of teachers to be considered before they are fired.

Neither Providence nor Newark has plans to close anything like as many schools as Detroit may have to. The beleaguered city has seen pupil enrolment plummet by more than 50% in the past decade, as residents move elsewhere in search of jobs. Falling state aid and dwindling local property taxes have only reinforced the trend. The school system needs radical restructuring. Robert Bobb, the school district's emergency financial manager, has tried several policies to try to balance the books, including closing 59 schools. Last month the state approved a plan to shut an extra 70 schools over two years: that would mean half of the remaining schools in Detroit disappearing. Mr Bobb thinks that is overdoing it, and that it may simply drive more pupils away.

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American football

# The owners take a punt

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**More money, more problems for the National Football League**



And my salary is this big

ALTHOUGH this year's Super Bowl pitted only the Pittsburgh Steelers against the Green Bay Packers, well over half of America tuned in. The match easily surpassed last year's contest as the most-watched television programme in American history, capping a season of record ratings for the National Football League (NFL), the association of 32 teams that runs the top level of the sport.

For the NFL that dominance translated into some $9 billion in revenues last season. But the league's players and its team owners are now arguing over how to divvy up the spoils. The owners have threatened to lock the players out if they cannot reach an agreement. The players in turn say they will dissolve their union and file an antitrust suit against the league. This could result in a most unusual labour dispute, where employees try to break up their union, while management fights to keep it together. If neither side gives in, the 2011 season could be at risk. As *The Economist* went to press, the two sides were still working with a mediator to iron out their differences. The talks have already been extended twice.

Professional football has enjoyed the longest period of industrial peace among America's three main sports leagues. But shortly after the NFL's current labour deal was signed in 2006, the teams' owners began to grumble about its terms. Under the agreement, they get $1 billion up front for operating and investment expenses and 40% of the remaining pot. The players receive the other 60% through salaries and benefits. The team owners now want an extra $800m up front and a fixed wage scale for first-year players.

Roger Goodell, the NFL commissioner, says the renegotiation is justified "so we can make the kinds of investments that grow this game." He notes that the league has not commissioned a new stadium since 2006. But the players are sceptical. They want the teams to open their books so they can assess their financial positions, a move the owners have resisted for good reason. According to *Forbes* magazine, teams' values rose 171% between 1999 and 2009. No team appears to be unprofitable.

But recently the estimated commercial value of NFL teams has fallen slightly and owners see fewer avenues for growth. Revenues from ticket sales have flattened out, and strapped local governments are unlikely to subsidise the costs of luxurious new stadiums, as they have in the past. Even the growth of the league's lucrative television contracts has begun to slow.

Still, America's recovery will surely help values recover again. And most of the league's television contracts will soon expire, potentially allowing it to negotiate huge new deals. Digital media has also opened up new opportunities for growth, and the league is trying to expand into international markets. A tweak to the current labour agreement may be in order, but the only way to do serious damage to the game's near-term prospects would be to shut the stadium doors.

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Lexington

# Muslims and McCarthyism

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**A witch-hunt on one side, denial on the other, as the threat of home-grown terrorism rises**




IS A new Joe McCarthy strutting his stuff up on Capitol Hill? You might think so, to judge by the abuse that has thundered down on the head of Peter King, chairman of the House Homeland Security Committee, following his decision to start hearings on "The Extent of Radicalisation in the American Muslim Community and that Community's Response". Even before the first one took place this week, the very idea of the hearings came under withering fire from liberal America. They were "fuel for the bigots", said Richard Cohen, a columnist at the *Washington Post*. "To focus an investigative spotlight on an entire religious or ethnic community is a violation of everything America is supposed to stand for," echoed Bob Herbert in the *New York Times*. "Security hearings that focus exclusively on Muslim Americans serve only to amplify the rumblings of Islamophobia that seem to become louder and crazier by the day," concurred Eugene Robinson, another of the *Post*'s columnists.

It is indeed hard to find much to like in Mr King. The representative for Long Island has approached this most sensitive of subjects with the delicacy of a steamroller, plus an overactive imagination and a generous dollop of prejudice. To be clear: he may not be prejudiced against America's Muslims (the "overwhelming majority" are "outstanding Americans", he says) but he long ago prejudged the question his own hearings are supposed to answer, being already firmly of the view that the country's Muslims are doing too little to counter radicalisation within their ranks. He is the author of a novel, "Vale of

Tears", in which a heroic version of his thinly disguised self busts a home-grown al-Qaeda cell at a Long Island Islamic centre. His own attitude to terrorism, though, is conveniently elastic. In the 1980s this Irish-American Catholic sympathised strongly with the Irish Republican Army, going so far as to compare Gerry Adams, the leader of Sinn Fein, the terrorist group's political wing, to George Washington.

Beyond these objections to his person, prejudices and past, most of the available evidence suggests that Mr King's central thesis is overblown, if not flat wrong. Muslim co-operation with the authorities is not perfect, but by most accounts-including those of Robert Mueller, the director of the FBI, and Eric Holder, the attorney-general-the community has in general worked hard to expose terrorist plots in its midst. In one prominent case last year, for instance, five men from northern Virginia who had travelled to Pakistan in search of *jihad* were convicted after their families tipped off the FBI. The Triangle Centre on Terrorism and Homeland Security, a research group affiliated with Duke University and the University of North Carolina, reported recently that 48 of the 120 Muslims suspected of plotting terror attacks in America since the felling of the twin towers in 2001 were turned in by fellow Muslims.

With the inflammatory Mr King planted on one side of the quarrel and pretty much all liberal opinion arrayed indignantly on the other, the hearings are expected to produce heat, not light. But it is worth noting that the liberal side has a defect of its own. Many say that Mr King's exclusive focus on Islam is misplaced, since terrorism can arise from any group or grievance (Timothy McVeigh and the Oklahoma City bombing of 1995 are suddenly much cited). But this is to let political correctness obscure a troubling development that America's terrorism experts had started to worry about well before Mr King announced his hearings. It is true that not all terrorism takes an Islamist form, but Islamist terrorism is the clear and present danger-and al-Qaeda has lately shown an unexpected ability both to recruit American Muslims and to move its battle back to American soil.

**The Americanisation of al-Qaeda**

Two experts on al-Qaeda, Peter Bergen and Bruce Hoffman, pointed out in a study last year that Americans have occupied some senior positions in al-Qaeda. Anwar al-Awlaki, an al-Qaeda leader in Yemen, grew up in New Mexico. Adnan Shukrijumah, probably al-Qaeda's director of external operations, is a Saudi-American who grew up in Brooklyn and Florida. David Headley, from Chicago and now in custody, scouted targets for the attack on Mumbai in 2008 that killed more than 160 people.

America is producing followers as well as leaders. When a bunch of Somali-Americans from the Minneapolis-St Paul area started turning up in Somalia to wage *jihad*, the authorities hoped that this was a one-off. But the phenomenon turned out not to be confined either to Minnesota or to Somalis. In November 2009 Major Nidal Malik Hasan, a Palestinian-American, killed 13 people at Fort Hood in Texas, and a few months later Faisal Shahzad, a Pakistani-American, tried to set off a car bomb in Times Square in New York. "The American melting pot", Mr Bergen and Mr Hoffman concluded, "has not provided a firewall against the radicalisation and recruitment of American citizens and residents, though it has arguably lulled us into a sense of complacency that home-grown terrorism couldn't happen in the United States." The White House is worried too: Barack Obama's National Security Strategy, published last May, promised to invest in efforts to counter radicalisation at home.

The subject, in short, is a real one. It merits frank discussion, not least in Congress. But Mr King's clumsy approach to it risks feeding the sense of beleaguerment and outrage many American Muslims have come to feel in the face of the recent scaremongering over the so-called "ground zero" mosque in New York and the Republican Party's paranoid fantasy about Islamic sharia law taking over America by stealth. As it happens, Mr King was in the forefront of the trumped-up objections to the Manhattan mosque. What folly to let such a man chair the Homeland Security Committee of the House of Representatives.

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Brazil's labour laws

# Employer, beware

**An archaic labour code penalises businesses and workers alike**




IN 1994 Ricardo Lemos (not his real name) and two friends bought a chain of pharmacies in Pernambuco, in Brazil's north-east. Immediately afterwards they were taken to court by four former employees of the pharmacies who claimed they were owed 500,000 reais (then $570,000) for overtime and holidays. Since the new owners lacked the payroll records, the labour court ruled against them-even though they had only just bought the business and the claimants had been in charge of payroll and work scheduling. The court froze their bank accounts, so they had to close the stores, with 35 redundancies. Seventeen years later three of the cases have been settled, for a total of 191,000 reais. The last drags on as the claimant's widow and son squabble over how much to accept.

Mr Lemos and his partners fell foul of Brazil's labour laws, a collection of workers' rights set out in 900 articles, some written into the country's constitution. They were originally derived from the corporatist labour code of Mussolini's Italy. They are costly: redundancies "without just cause" attract a fine of 4% of the total amount the worker has ever earned, for example. (Neither a lazy employee nor a bankrupt employer constitutes just cause.) Some are oddly specific: for example, annual leave can only be taken in one or two chunks, neither of less than ten days. In 2009, 2.1m Brazilians opened cases against their employers in the labour courts. These courts rarely side with employers. The annual cost of running this branch of the judiciary is over 10 billion reais ($6 billion).

Businessmen have long complained that these onerous labour laws, together with high payroll taxes, put them off hiring and push them to pay under the table when they do. When Luiz Inacio Lula da Silva, a former union leader, became Brazil's president in 2003, they hoped he would be better placed than his predecessors to persuade workers that looser rules would be better for them. But scandals in his first term derailed these and other hoped-for reforms. More recently, as Brazil's economy has boomed, with record numbers of jobs created, the need for change has seemed less pressing (see

article). The laws are "very up-to-date", the labour minister, Carlos Lupi, said in December. He wants firing workers to become still pricier.

That many of the new jobs are formal (ie, legally registered) is despite, rather than because of, the labour laws. The trend to formalisation is largely a result of the greater availability of bank credit and equity capital on the one hand, and recent changes that make it easier to register micro-businesses on the other. And it coexists with two longstanding Brazilian weaknesses: high job turnover and low productivity growth.

Gustavo Gonzaga, an economist at Rio de Janeiro's Catholic University, notes that a remarkable one-third of Brazilian workers are made redundant each year, a fact he attributes in part to the labour laws themselves. These are extraordinarily rigid: they prevent bosses and workers from negotiating changes in terms and conditions, even if they are mutually agreeable. They also give workers powerful incentives to be sacked rather than resign. Generous and poorly designed severance payments cause conflict, Mr Gonzaga says, and encourage workers to move frequently. That churn affects productivity, as employers prefer not to spend on training only to see their investment walk away.

Recently, the cause of reform has gained a surprising recruit: the very trade union that Lula himself once led. The ABC metalworkers' union, which represents 100,000 workers in the industrial suburbs of Sao Paulo, is trying to make union-negotiated agreements binding in the labour courts. At present unions in Brazil cannot strike the sort of deals that are common elsewhere, such as accepting pay cuts during downturns in return for no job losses, since individual workers may later ask the labour courts to unpick them. Helio Zylberstajn, the president of the Brazilian Institute of Employment and Labour Relations, a study group, thinks the initiative is promising. Unions with the power to negotiate might spend more time representing their members and less cosying up to politicians, he says. And employees' grievances might get resolved quickly in the workplace, rather than slowly in court.

The metalworkers' proposals could improve matters, at least for big companies. For smaller firms, and foreign investors, the best advice will still be "employer, beware". Ana Rita Gomes, of Mattos Filho Advogados, a Sao Paulo law firm, talks to potential clients about what she calls "pots of gold": practices that seem innocuous to the uninitiated, but lead straight to the labour courts. One example is stating salaries in a foreign currency. Exchange-rate fluctuations mean that this falls foul of a ban on ever paying an employee less one month than the previous one. Once her clients are suitably terrified, she explains why they should still proceed-with caution. "These difficulties put other investors off," she says. "That means less competition for them, and higher profits."

In Pernambuco Mr Lemos is turning his mistakes to good use by advising other businessmen. He tells them to walk away from a deal unless the seller can produce payroll records, settles all outstanding labour-court cases and promises compensation if further cases are brought regarding matters that predate the sale. The new owner will still be liable if the old one cannot pay, he says, but at least there is less scope for bad faith. He recently learned that before his own ill-starred purchase the seller told his staff that the new boss was rich, and that they should save up their grievances until the deal went through.

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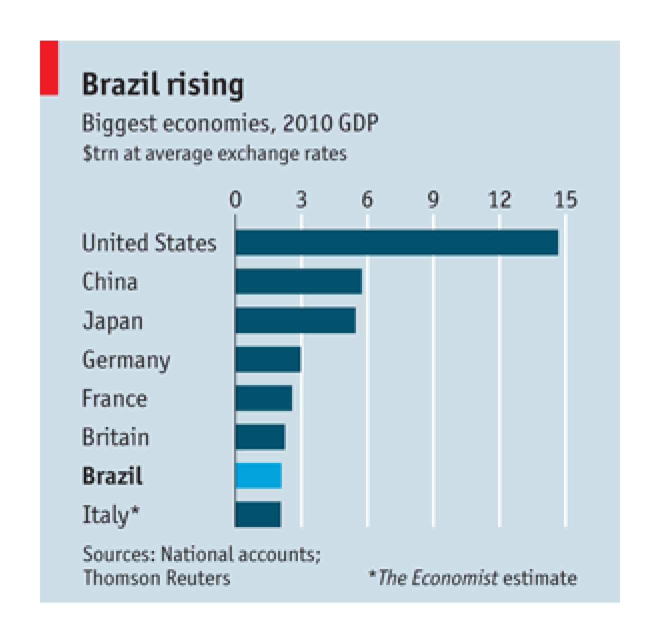
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Measuring Brazil's economy

# Statistics and lies

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**Very big, but not the world's fifth-largest economy quite yet**




THE release of last year's economic figures on March 3rd was cue for much crowing in Brazil. The economy grew by a blistering 7.5%, a rate unmatched since 1986. Since the currency started 2010 strong and ended it stronger, a GDP of 3.675 trillion reais converted at the year's average exchange rate into $2.089 trillion. This meant that Brazil overtook Italy to rank as the world's seventh-biggest economy (see chart). And income per head in Brazil has surpassed that in Mexico.

The president, Dilma Rousseff, welcomed the figures, but warned Brazilians not to expect a similar rise in 2011. Worried about overheating, her government is trimming 50 billion reais from this year's budget. On March 2nd the Central Bank raised interest rates by half a percentage point for the second time this year. The aim is for growth to ease to a more manageable annual rate of 4.5-5%.

But her finance minister, Guido Mantega, could not resist a little boosterism. Brazil had grown fifth fastest of the G20 countries, he said, adding that, if its GDP were calculated taking into account purchasing power, it had overtaken Britain and France, too. Some of his listeners inferred that it had become the world's fifth-biggest economy. (But the same trick bumps Russia and India up from tenth and 11th respectively to fourth and sixth, leaving Brazil seventh overall.)

It was a confusing performance, and many were duly confused. The following day Brazilians were told by some of their newspapers that they were living in the world's seventh largest economy, and by others, the fifth. Jim O'Neill of Goldman Sachs, who coined the BRIC acronym in 2001, sent an e-mail to clients in which he asked why Brazil's ascension to the top five had attracted so little comment.

Converting currencies by purchasing power, rather than market rates, is useful when comparing living standards in different countries. But measuring GDP in current dollars shows an economy's international clout-and by that yardstick, Brazil needs no statistical smoke and mirrors. Even the modest 4.5% growth Ms Rousseff hopes for is likely to be more than France or Britain manages in 2011. And with interest rates and the price of its commodity exports rising, there is no sign of the real weakening much. Brazil did not break into the big five last year. But it may well do so during this one.

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Honduras and its former president

# Why a pariah may return

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**Many now have reason to want Manuel Zelaya to come home**

SINCE the confused morning in June 2009 when its president was marched to the airport at gunpoint and sent packing, Honduras has been creeping back towards something resembling normal political life. Porfirio Lobo, a conservative who was elected president in a reasonably fair contest five months after the coup, is popular at home. Most of the world now recognises his government, meaning that the vital tap of international grants and loans to one of the poorest and most violent countries in the Americas has been turned back on. Last year the Honduran economy was restored to growth, which many forecasters think will accelerate this year and next.

Yet political life in Tegucigalpa, the higgledy-piggledy mountain capital, cannot get back to normal until relations are patched up with Manuel “Mel” Zelaya, the left-wing former president, who remains in exile in the Dominican Republic. As long as Mr Zelaya is away, a hard core of governments, including Brazil, Argentina and left-wing allies of Venezuela’s Hugo Chavez, will have nothing to do with Honduras. While they freeze the country out, Honduras has little chance of rejoining the Organisation of American States, a regional group that is one of the remaining obstacles to a normal existence on the international stage. And since Nicaragua’s president, Daniel Ortega, is one of those who still boycotts Honduras, previously routine co-operation among Central America’s leaders has got harder.

After his ejection from office Mr Zelaya was charged with a string of crimes, some related to his alleged attempt to prolong his time in office illegally, and others to do with misuse of public funds. Mr Lobo, anxious to move on and restore normal relations with the rest of the world, has managed to approve an amnesty to cover the political crimes. But this does not include the corruption charges and so Mr Zelaya remains on his Dominican beach.

Both friends and foes of the mustachioed, stetson-wearing former president now want him back in the country. A loyal band of supporters sees Mr Zelaya’s return as essential to undoing the coup. Their “resistance” movement has struggled to make an impact while its leader remains stranded offshore. Mr Zelaya’s return would unite the left, neutralise ultra-left radicals in the resistance movement and at last provide Mr Lobo with a worthy opponent, says Victor Meza, Mr Zelaya’s former interior minister. Others think that Mr Zelaya’s wife, Xiomara Castro de Zelaya, is gearing up for a presidential bid on the back of her husband’s eventual triumphant return.

Yet the government also has reason to want Mr Zelaya back, or to at least tolerate the idea. His return could just as easily split the left as unite it: many in the resistance movement are no fans of the former president, though they opposed the manner of his removal.

Mr Zelaya’s return to Honduras would require him—if he wants to remain politically relevant—to address the country’s problems, which include flourishing crime and wilting public services. He failed to do so while in office. According to a leaked cable, the American ambassador—who opposed the coup—wrote that Mr Zelaya’s goal was “to enrich himself and his family while leaving a public legacy as a martyr who tried to do good but was thwarted at every turn by powerful, unnamed interests.” But Mr Zelaya’s supporters doubt he would get a fair trial. Either way, Mr Lobo would rather his opponent came back now, while his own approval ratings are healthy, than during some future crisis.

Even so, a reconciliation is likely to be difficult. The attorney general and the supreme court are opposed to dropping the corruption charges against Mr Zelaya. Both were appointed for seven-year terms shortly before the coup by a congress that was vehemently anti-Zelaya. Mr Lobo could probably persuade the new congress, where his National Party has a healthy majority, to oust the judges. But after the constitutional earthquake of 2009, bullying the judiciary is the last thing he wants to be seen to be doing.

Two opportunities lie ahead. A truth commission, originally due to report this month, will publish its delayed findings in mid-May. Mr Zelaya has declined to co-operate with the commission, labelling it a stitch-up. Nonetheless, it is likely to conclude that his removal was indeed unconstitutional and propose constitutional reforms to prevent a recurrence of the conflict of powers that lay behind the coup. It is expected to make recommendations regarding the return of Mr Zelaya, which will put pressure on those who are standing in the way of a compromise.

Secondly, an appeal seeking to annul the corruption charges has been filed with the supreme court, which this month appointed a justice to consider it. The justice in question, Ã“scar Chinchilla, is thought to be open-minded, though his decision will eventually have to be endorsed by more hardline colleagues. Because Mr Zelaya was denied his right to due process when he was shoved into an aeroplane in his pyjamas, there may be an argument for dropping the charges.

One way or another, it is hard to see Mr Zelaya remaining beached indefinitely when it is increasingly everyone’s wish that he come back. Whether he will be met with cheers or indifference remains to be seen. The coup against Mr Zelaya caused international outrage, but he would be mistaken to confuse that with enthusiasm for his ineffective rule. For many of those who decried the coup against Mr Zelaya, it may be that nothing in his presidency became him like the leaving it.

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Managing cities

# Bogota's rise and fall

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**Can Enrique PeÃ±alosa restore a tarnished municipal model?**




Transports of crowded discomfort

THE bright-red articulated buses of Bogota's TransMilenio, with their dedicated lanes and station-style stops, were once the symbol of a city that had been transformed from chaos and corruption in the 1980s into a model of enlightened management admired and imitated across Latin America. Today the chaos and corruption seem to be back. The TransMilenio buses are horribly overcrowded even at off-peak times, attracting muggers and pickpockets. Though murder rates continue to slide, only 20% of those asked in a poll in September said they felt safe in their city and 27% said they had been victims of crime in the previous year. Road-building at more than 200 separate points across the city of 7.4m people is choking traffic. Things will get worse in May when work starts on Carrera Septima, one of the main arteries.

Bogotanos blame this backward slide on their mayor, Samuel Moreno, a populist from the left-wing Democratic Pole party. In a poll last month by Gallup, 85% of respondents disapproved of his administration. Contractors claim that the mayor and his brother, a senator who resigned this month from the Democratic Pole, have demanded kickbacks for public works. "Lies, lies, lies," says the mayor. The government's independent inspector-general has begun an investigation all the same. The inspector has already forced the sacking of the city's comptroller, Miguel Angel Moralesrussi, and banned him from public office for 20 years.

Whatever the outcome of the inquiries, the city is due to elect a new mayor in October. The candidate comfortably leading the Gallup poll is Enrique PeÃ±alosa (with 39%). As mayor from 1998 to 2001, he did much to change the face of Bogota. As well as TransMilenio, he built more than 200km of cycle paths, a network of public libraries and got private schools to run new public schools in the poorer south of the city.

But Mr PeÃ±alosa, who was once talked of as a future president of Colombia, is better at urban management than at politics. Mr Moreno beat him easily in 2007 by promising to start building a metro-a pledge which he has yet to keep. Mr PeÃ±alosa, ever the technocrat, pointed out in vain that TransMilenio offered much better value for money.

Can he win this time? His political alliances are wide but potentially contradictory. He is standing for the Green Party, co-led by another former mayor, Antanas Mockus. But Mr PeÃ±alosa also enjoys the backing of Alvaro Uribe, Colombia's conservative president between 2002 and 2010. Mr Mockus unsuccessfully ran for president last year against Juan Manuel Santos, the man whom Mr Uribe eventually backed as his successor. Mr Uribe is anathema to many of the Green Party's leftish rank and file. Several prominent members have defected; others have tweeted their disgust. Many in the U Party of Mr Uribe and Mr Santos are not happy either, arguing that they should field their own candidate.

Mr PeÃ±alosa doubtless hopes that the voters will be less sectarian than the activists, and that above all they want their city to be run well. But he is taking no chances. "Having several metro lines would be extraordinary," he said recently. Extraordinarily expensive, he might add.

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Corruption in India

# A million rupees now

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**Congress drags its feet over tackling graft. It may pay a high price**




THE prime minister's loyalty to his friends looks to be ever more a fault. This week parliament grilled Manmohan Singh over his latest failure to fight corruption and his habit of sticking with compromised allies. The grilling concerned P.J. Thomas, the man Mr Singh appointed to lead India's fight against corruption.

Mr Thomas was, to put it politely, an unorthodox choice to lead the national "vigilance" commission. A former official in the scandal-besmirched telecoms ministry, he faces a longstanding charge over an import scam. He has done himself few favours by pointing out that 28% of sitting lower-house members of parliament also face criminal charges or inquiries. Worse was the government's claim that a vigilance chief need not have an impeccable character (presumably on the grounds that it takes one to know one). On March 3rd the Supreme Court forced him out. The prime minister fended off opposition demands that he should resign.

His poor judgment over Mr Thomas fits a pattern. Nobody says the prime minister is personally corrupt. But he looks weak by seeming to let others steal. Last year the Supreme Court ticked him off and the opposition called for him to quit over the government's failure to look into suspicious licensing of the 2G telecom spectrum. Now the Central Bureau of Investigation is starting an inquiry into corruption at the highest levels over the shoddily run Commonwealth games. Mr Singh, again, is bound to be embroiled.

The Supreme Court has its tail up. Its rulings refer ever more often to corruption-over 50 did so last year. Now it lambasts the government for failing to take on crooks who funnel "black money" overseas. Some say that $450 billion of ill-gotten gains or untaxed earnings are sitting in foreign banks. The court seems to imply that the Congress party, which heads the government coalition, has protected powerful friends.

On March 7th the hyperactive Supreme Court justices scored another victory, with the arrest of Hasan Ali Khan. A flamboyant horse-owner, he has been charged with money laundering, which he denies. He is alleged to have $8 billion stuffed in Swiss bank accounts.

India's "season of scams" was launched late last year, thanks to the breakdown of an unspoken political truce in which no party fussed too much about corruption, allowing all to prosper from it. Now the opposition Bharatiya Janata Party (BJP) has broken ranks, betting that it can tap into widespread fury over corruption and so dent Mr Singh's clean image, if not topple him. The BJP may be on to a good thing: over 80% of Indians tell pollsters that graft is worse than ever.

Though a general election is not due until 2014, and despite facing corruption scandals of its own, the BJP is pushing on. By boycotting parliament, it closed most of the winter session, until it won the inquiry into graft that it had demanded. In turn the press, the courts and street protesters picked up the campaign. The opposition may be keeping in mind an earlier defeat for Congress, in 1989, when voters punished the party over huge kickbacks that flowed from an arms deal with Bofors, a Swedish company.

In response, Mr Singh and his (and Congress's) boss, Sonia Gandhi, say they will soon announce sweeping reforms. These may include state funding for political parties, the removal of discretionary powers abused by politicians and civil servants, and the ratification of a UN corruption convention. They might do well to look, too, at Bihar state, where elected officials and civil servants must now publish a list of all their private assets. Even more importantly, they could push on with cleaner ways to help the poor. By one estimate, two-fifths of state paraffin subsidies are stolen, earning a "fuel mafia" $2 billion a year. In Uttar Pradesh reportedly over $40 billion of food and other subsidies have been bilked over five years.

**From the grassroots up**

How all this will shake out at the polls will become clearer next month, when four states-West Bengal and Assam in the east, Tamil Nadu and Kerala in the south-hold assembly elections. Perhaps voters will punish dirty politicians. Too often, though, for all their harrumphing about *ghotala* (Hindi for scams), voters are swayed during election campaigns by candidates' gifts of rice, rupees, saris and television sets.

Yet hopeful initiatives do exist among those truly fed up with corruption. Technology looks to provide especially promising solutions. Last year Swati Ramanathan helped to found a website, www.ipaidabribe.com. Indians post details of how they are forced to bribe. "Rather than moralise about corruption," she says, "we need first to know the details of what is happening, and uncover its market price."

In seven months the site has lodged 5,000 reports of paying bribes. On March 9th, for example, someone in Belgaum, Karnataka, admitted shame after giving 200 rupees ($4) to pass a driving test. In Mumbai it costs 1,000 rupees to register a baby. Bigger bribes are usually paid when land is at stake. Perhaps when Indians are better informed they will feel more empowered and refuse to pay. Reportedly, Bangalore's transport commissioner likes the site too, as it lets him see how corrupt his junior officials have become.

More hopeful yet are reforms that take away the chance for officials to behave improperly. Gujarat's anti-graft commissioner, Manjula Subramaniam, praises a tendering system where companies bid online for public contracts, for example for road-building. This helps her anti-graft department spot anything suspicious. She can also watch funds that sit unused in state coffers, and move them before any light-fingered officials get there.

For ordinary people, more obviously valuable is a four-year-old system for homeowners to assess property tax online, rather than have crooked inspectors visit their homes. And the benefits of technology are spreading fast, as every village in Gujarat has been hooked up to broadband and to state databases.

In one of them, Uvarsad, a farming district, a privately managed local e-government office allows Suryakant Patel to print off the title deeds to his 20-acre wheat and rice farm. It takes two minutes and a ten-rupee fee. Then he walks around the corner to a bank, to raise a loan to buy a new irrigation pump. In the past, he says, getting the deed would have taken days, and might have depended on the whim of a civil servant. Change can come fast, he reckons. Mr Singh, take note.

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China's security state

# The truncheon budget

**China boosts spending on welfare-and on internal security, too**




Don't even think about strolling

AMONG the misleading and ill-explained details that, as usual, spiced up China's annual budget, unveiled on March 5th, were some especially eye-catching numbers for security. The surprise was not just that China's military budget had resumed double-digit growth after a one-year hiatus, but that spending on internal security was higher and growing even faster. The state sees an abundance of threats within.

The risk that turmoil in the Middle East will spread to China is one of them, though the prime minister, Wen Jiabao, studiously avoided mentioning events there in his two-hour address to the country's legislature, the National People's Congress (NPC). Mr Wen did, however, speak of the need to "solve problems that cause great resentment among the masses", such as the illegal demolition of housing and the forced appropriation of farmland.

The NPC session, an annual rubber-stamp affair lasting a few days, was full of measures intended as crowd-pleasers. Central-government spending on education, health care and social security is to increase by more than 16%, and on subsidised housing by more than a third. Two days before the session began, Chinese media published a surprising survey indicating that only 6% of citizens felt happy. More welfare spending, perhaps, is to keep unhappy people off the streets.

Officials are less eager to draw attention to their preferred option for keeping the peace, namely beefing up security. The budget presented to the NPC calls for spending of 624 billion yuan ($95 billion) this year on items related to law and order, 13.8% more than in 2010. Military spending is to increase by 12.7%, to 601.1 billion yuan. This follows an unexpected easing of its growth last year to 7.5%. But for a second consecutive year it will be less than the outlay on internal security.

The authorities' horrified response to anonymous calls on the internet for a "jasmine revolution" in China will add to the cost of policing. For three Sundays in a row central areas of several Chinese cities have been saturated with uniformed and plainclothes officers. They have staked out shopping streets where the internet messages have urged protesters to "stroll" (a euphemism often used in China for demonstrating, which the police hardly ever permit). The messages have said these

protests, which have yet to materialise, should continue every Sunday indefinitely. The police clearly worry that if they scale back their deployments people will converge at the appointed places.

A day after the latest such security operation, the foreign minister, Yang Jiechi, blandly told journalists that he had noticed no kind of tension in China. He also denied that police had beaten foreign journalists trying to report in the designated areas, even though one had been kicked and hit by goons and others roughed up less severely in full view of uniformed officers. The authorities have decided to rescind-at least partially-their 2007 decision to give foreign correspondents freer rein. Now correspondents "must apply for approval" to conduct interviews in Beijing.

Antagonism towards the foreign press, and a sweeping round-up of Chinese dissidents, could also signal concerns about tension within the leadership as it prepares to hand over power to a younger generation next year. Power struggles in China have a habit of going hand-in-hand with street protests (the Tiananmen Square unrest in 1989 broke out amid fierce confrontation at the top). On March 5th-6th the state media, which had kept silent about the "strolls", published editorials stridently denouncing them. The *Beijing Daily* called for "constant vigilance against these people with ulterior motives" who wanted to "throw China into turmoil". Echoes of hardline language at the time of Tiananmen.

A rare criticism of the government's approach appeared this week on the website of the state-run news agency, Xinhua, in an article by a scholar in Singapore. China, it said, would enhance its stability far more if it were to turn its "colossal expenses on stability maintenance" to improving people's livelihoods instead. The leadership is beefing up spending on both, but seems not to know which one will work better.

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China's economic blueprint

# Take five

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**The prime minister lays down how China's economy is to look in 2015**

"GRANDPA WEN", China's prime minister, Wen Jiabao, is a hands-on patriarch. In his annual speech to China's National People's Congress on March 5th he reflected on the government's work over the past year, its priorities for this year, and its new five-year plan, which the congress must ratify. Like a good guardian, Grandpa Wen neglected no aspect of his wards' lives.

On top of the stern duties of safeguarding price stability and national security, Mr Wen promised to enhance national creativity, enrich philosophy, arouse an innovative spirit, resolutely oppose extravagance-and ensure one hour of physical exercise in schools every day.

The aim of all this enhancing and arousing is, by the end of the decade, to turn China into a *xiaokang* society. The term traces back to the Confucian "Book of Songs", and suggests a moderately prosperous society that can begin to enjoy the fruits of its labours.

To help China on its way, Mr Wen set a target for economic growth of 7% a year for 2011-15. The figure should not be taken too literally. A target of 7.5% for the past five years did not stop China growing by more than 11% over that period. Still, the target is lower than it was in the previous plan, suggesting that the pattern of growth now matters as much as the speed.

Indeed, Mr Wen said the country's development is neither balanced, co-ordinated nor sustainable. It relies too heavily on investment and on swallowing natural resources and too little on consumer spending. The income generated is unevenly divided: between profits and wages, rich households and poor, coastal provinces and inland regions, the cities and the countryside.

The prime minister also admitted that China had failed to meet at least three targets he set in the previous five-year plan. Two related to China's service industries, which last year accounted for 43% of its GDP and 35% of its employment. Countries at China's stage of development typically have service sectors approaching three-fifths of GDP.

Most of China's more lucrative services markets, such as for telecoms, are dominated by state-owned enterprises (SOEs). The "investment hunger" of the SOEs, which borrow cheaply from state banks as well as recycle outsized profits, is a chief cause of China's unbalanced development. Mr Wen promised to implement no fewer than 36 guidelines for opening the "glass doors" preventing private investment in many fields not explicitly reserved for the state. Such fields include transport, power and municipal utilities.

Regrettably, in the year ahead these liberalisations may be offset by efforts to stop the economy from overheating. The government is trying to contain inflation by squeezing credit. And although it urges banks to keep lending to smaller companies, lenders are sure to turn private borrowers away before disappointing state-owned ones. If necessary, Mr Wen says, the government will also control prices by "administrative means".

Liberal-minded types will take some comfort from Mr Wen's promise to "press ahead" with making the yuan convertible for capital-account transactions, a commitment missing from his previous two reports. He also promised to push forward with the "market-based reform" of interest rates. The hope is that freer rates would better reward household savers, discourage excessive investment and possibly allow private borrowers to get loans from state banks by offering to pay higher rates. But Chinese leaders have often before promised to liberalise rates.

China's idiosyncratic pattern of development is never easy to categorise. To some it represents a new model of state capitalism: "a Beijing consensus" to rival the "Washington consensus" first identified by John Williamson of the Peterson Institute for International Economics. Others think China is moving closer to the Washington model. Arthur Kroeber of Dragonomics, a consultancy, argues that it has made solid progress on eight of Mr Williamson's ten commandments, including fiscal discipline and an openness to foreign trade and direct investment. To follow through on its promise to liberalise interest rates would make a welcome ninth.

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Japan's political turmoil

# Abandon hope?

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**Yet again, a Japanese government is tottering**




"PRIME MINISTER KAN, this is no time for you to nap," barked Shoji Nishida, an opposition lawmaker shortly before he made insinuations that led to the resignation of Japan's foreign minister on March 6th. Sure enough, his actions have thrown the government of Naoto Kan (pictured above, right) into peril.

During questioning in the Japanese Diet (parliament), Mr Nishida, who is unaffectionately known as the "Bombshell", forced the minister, Seiji Maehara (pictured above on the left), to admit that he had taken political funding from a Korean-born Japanese resident (see article). That would be illegal if Mr Maehara knowingly accepted the donation, which he says he did not.

Mr Maehara abruptly quit, robbing Mr Kan of perhaps the administration's steadiest hand. The 48-year-old had refurbished Tokyo's strained relations with America, and looked like a prime minister-in-waiting. He was replaced by his deputy, Takeaki Matsumoto. The blow comes as Mr Kan struggles to pass a budget in the face of political gridlock. The ruling Democratic Party of Japan (DPJ) faces a pounding in local elections in April. Soon, Mr Kan may be on the ropes.

What chiefly prevents him from becoming the fifth prime minister to fall in as many years is the lack of a credible replacement, either in his party or in the opposition. Mr Kan's hold over his own party has grown too flimsy for his bold promises to reform Japan's tax and social-security system, and open the country to free trade, to carry much weight. Yet his rivals in the DPJ, a good many of whom are lowly first-time lawmakers, seem to fear a general election as much as he does.

The opposition, led by the Liberal Democratic Party (LDP), threatens to use its upper-house majority to block bills needed to finance next year's budget. By the summer the government might run out of money. The LDP's bet is that Mr Kan will need to dissolve parliament in return for winning support for the budget. If he resists, the LDP might censure him in the upper house, producing a similar outcome.

But however unpopular Mr Kan is, the LDP, foaming at the mouth and bereft of ideas, has scarcely more support. Indeed, the only group benefiting from the political mess is a raucous regional tax-cutting movement attacking mainstream politics. Some call it the "sake" party, an allusion to America's tea-party movement.

For all their mutual antagonisms, the mainstream parties broadly share long-term aims for Japan: they want a stronger social-safety net, slightly higher taxes and a more open economy. During nine months in office, however, Mr Kan, a former civil-rights activist, has come across as an agitator rather than a builder of bridges. The opposition, meanwhile, has

been petty and vituperative. Neither party would convincingly win a general election. The hunt for a leader with the innate Japanese skill of *nemawashi*, or consensus-forming, will be key. Such a leader is not in sight.

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Koreans in Japan

# A foreigner in her own home

**Shoddy treatment of its Korean residents once again deals Japan a black eye**

IN A part of Kyoto so trusting that vegetables are sold via honesty boxes, a 72-year-old woman hides in her house in fear, she says, of foreigner-baiting right-wing thugs. On March 4th it emerged in parliament that she had donated Â¥250,000 ($3,000) over five years to the political funds of Seiji Maehara, whom she befriended when he was a fatherless teenager and who rose to become foreign minister. On March 6th he resigned.

The donation was illegal because she is a resident of Japan who was born in what is now part of South Korea. That makes her technically a foreigner. Mr Maehara says he did not know of her gift, and she says she did not know it was forbidden. Speaking bitterly through the intercom of her home, she says that she came to Japan when she was five, has paid tax and "the highest amount of national health insurance" since she started her barbecued-beef restaurant 37 years ago, and "knows nothing about South Korea". But because she has never taken Japanese citizenship, she is not allowed to play a role in politics.

Like other of the 406,000 *zainichi*, Koreans resident in Japan, she has sought to avoid discrimination by adopting a Japanese name (which, mercifully, the press has not disclosed). That would make it hard for any politician to know her nationality. But Shoji Nishida, an opposition lawmaker, heard that a photograph of her and Mr Maehara hung in her restaurant. Barbecue restaurants are often run by *zainichi*, and Mr Nishida combed the minister's political-funds report to see if she was a donor. For Mr Maehara, the repercussions were swift.

The incident exposes the unsatisfactory status of Koreans in Japan as descendants of those brought over, often forcibly, during Japan's brutal colonisation of the Korean peninsula. The Democratic Party of Japan has unsuccessfully sought to change the law to allow permanent Korean residents to vote in local elections.

On the one hand, such permanent residents are free to renounce their South Korean citizenship (and roots) in order to secure their political rights, however much they dislike Japan's historical legacy. On the other, shoddy tactics to expose what looks like a well-meaning woman's mistake will only make them less trusting of the only place they know as home.

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Australia's carbon debate

# Flammable, not inert

## Gillard moves under a cloud of carbon




BEFORE her election last August, Julia Gillard, Australia's prime minister, had promised "no carbon tax under the government I lead". So she had some explaining to do when announcing, on February 24th, plans for what looks rather like a tax: a mandatory carbon price. Carbon policy is becoming the "third rail" of Australian politics. An earlier failure by the ruling Labor Party to set a price led to Ms Gillard's coup against her predecessor as party leader, Kevin Rudd. This time around, the party's latest carbon pledge will test Ms Gillard's own political survival.

Voters are sceptical. An opinion poll on March 8th by Newspoll showed 11% more people against a carbon price than for it. Worse, polls of voting intentions look calamitous. The number who will cast their first vote for Labor has fallen to 30%, the lowest in Newspoll's 26-year history.

Ms Gillard tried to brush the problem aside by declaring that Australia had to transform its "carbon-pollution-intense economy", and that she was determined to win the debate. On the first point, at least, she is right. Coal, a dirty source of carbon dioxide, is Australia's biggest export commodity and fuels about four-fifths of its electricity, making the country the world's highest carbon emitter per person. But Ms Gillard will achieve her vow to win the debate only with a grubby political fight.

So far, the government has offered just the bare bones of a plan. From July next year, polluters would pay a price (not yet set) on each tonne of carbon they emit. Between three and five years later, this would turn into a market-based trading scheme, allowing polluters to buy permits and sell them to others if they instead cut their own emissions. Once, bipartisan support existed for such an emissions-trading-scheme. But that died when Tony Abbott became opposition leader in December 2009. Sensing a chance to destabilise Ms Gillard's minority government, Mr Abbott has launched a ferocious campaign against her carbon policy. He says it will change Australians' way of life (surely one of its intentions). He calls for a "people's revolt" against it.

Business leaders, too, have held back endorsement, if more soberly. Besides the price of a carbon tax, another question worrying them is the level of compensation planned for high-emitting industries that could be threatened by competitors in countries where no carbon taxes apply.

The government has yet to resolve such questions with the Australian Greens, on whom it depends for support in parliament. Some Greens want the coal industry closed altogether. Bob Brown, their leader, says the industry should help

pay for damage from recent devastating floods in Queensland because, he claims, burning fossil fuels helped to cause them. Ms Gillard wants her carbon plan to become law later this year, well ahead of the next election due in 2013. Satisfying both the Greens and Australian business at the same time may prove harder than seeing off Mr Abbott's scare stories.

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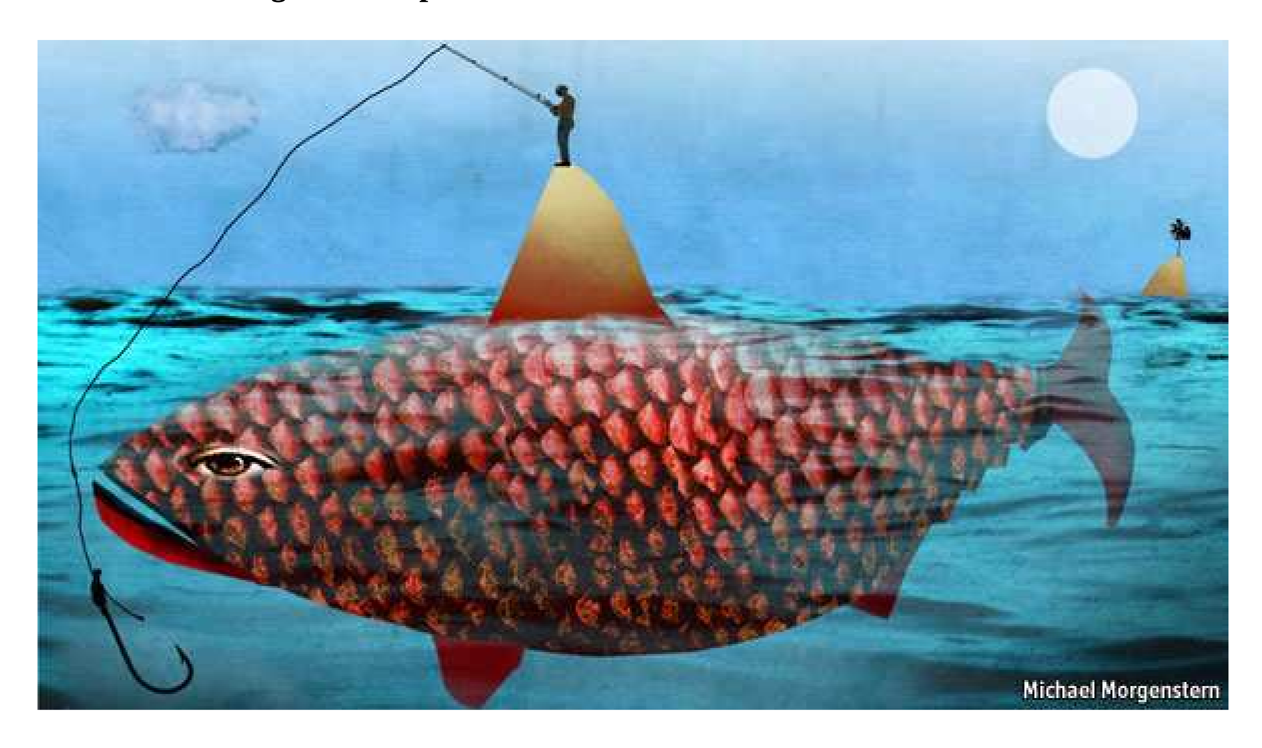
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Banyan

# Carps among the Spratlys

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**The risk that almost comical regional competition in the South China Sea turns serious**


Michael Morgenstern

YET again rival claimants to little specks of rock, sand and coral in the South China Sea are losing their tempers. The Philippines is incensed about an incident on March 2nd when, it says, two Chinese patrol boats threatened to ram a ship conducting a survey at Reed Bank, off its island of Palawan. On March 4th Vietnam also protested to China, about military exercises in waters it claims. Most probably these tiffs will blow over, as usual, long before anybody gets hurt. Yet the risks are mounting that a random incident in a bewildering array of quarrels may escalate into conflict, if only because no prospect exists of a settlement.

That is partly because the sea is entangled in so many separate disputes. China and Vietnam claim sovereignty over the Paracel island chain, from which China evicted Vietnam in 1974, in the dying days of the Vietnam war. Taiwan-because it is the "Republic of China"-mirrors China's claim. The same three parties also contest the Spratly archipelago, to the south. But in the south Malaysia, the Philippines and Brunei also have partial claims.

Some of these arguments might in theory be solvable under the 1982 United Nations Convention of the Law of the Sea (UNCLOS). In 2009, for example, Malaysia and Vietnam made a joint submission, showing where they thought their claims lay, based on their continental shelves. China, however, objected to that submission and tabled its own map, with

nine dotted lines outlining its claim. Joined up, these lines give China almost the whole sea. There seems no basis for this in UNCLOS. But China points to a map in use since the Republic of China published it during the Chinese civil war in the 1940s and says that, until quite recently, nobody minded. Indonesia, in turn, objected to China's objection, since its claim encroached on Indonesian waters, too.

According to American officials, China last year began talking of its claims in the South China Sea as a "core" national interest, which would put it on a par with Tibet and Taiwan. In return, America has proclaimed its own "national interest", citing the importance of the freedom of navigation and of overflight. Neither is under immediate threat. China and America, however, have long disagreed about whether America's armed forces have the right to conduct manoeuvres within other countries' 200-mile exclusive economic zones (EEZs), and to spy on them even from inside their (12-mile) territorial waters. Two years ago America complained when Chinese vessels harassed a surveillance ship, the USNS *Impeccable*, in the South China Sea south of the Chinese island-province of Hainan. America's vociferous involvement, notably at a regional security forum in Hanoi last July, was welcomed at the time by most of the ten members of the Association of South-East Asian Nations (ASEAN). China, though, fumed at America's unrealistic offer of "mediation".

Yet another dispute divides China and ASEAN. These two parties reached a common "Declaration on the Conduct of Parties in the South China Sea" (DoC) in 2002 in an attempt to minimise the risk of conflict. But efforts to turn this into a formal and binding code have gone nowhere. China argues that ASEAN has no role in territorial issues. It prefers to pick off rival claimants one by one. ASEAN argues that its own charter obliges members to consult, as they do before each working group on the code of conduct, the next one of which is due soon. Another difficulty for the DoC is that Taiwan is not a party. Though Taiwan occupies only one Spratly islet, it is the biggest, now boasting a long runway.




Optimists argue that the DoC has at least helped keep tensions down. Indeed, since 1988, when China and Vietnam clashed near the Spratlys, there have been no serious armed flare-ups. Tension rose in 1995, when China was found to have built on Mischief Reef, claimed by the Philippines. Fishermen are sometimes locked up for encroaching on another country's claim. But the risk of escalation into conflict has seemed limited.

It is even possible to claim that the "self-restraint" the DoC demands is being observed. Since 2002 no uninhabited islands or rocks have been occupied. But maybe none of those left is big enough, and on those that were already occupied, building has continued. Rommel Banlaoi, of the Philippine Institute for Peace, Violence and Terrorism Research, a think-

tank in Manila, has an impressive collection of photographs of South China Sea structures. On Mischief Reef, for example, China has built a "fisherman's shelter" in the form of a three-storey concrete fortress, surrounded by five octagonal structures, also in concrete.

Such digging-in, accompanied by frenetic military modernisation by most of the claimants, is one reason to worry that the stakes in the South China Sea are becoming bigger. Another is China's proclivity for muscle-flexing. South-East Asia has seen how China is ready to bully Japan over contested waters in the sea between them. Just this week Japan lodged a formal protest after a Chinese helicopter flew close to one of its ships. That the South China Sea has become a focus of American determination to remain an Asian power adds yet another source of tension.

**Unsporting behaviour**

Moreover, the sea offers fishing bounty and is a vital shipping route for a big chunk of world trade. It has also, particularly around the Spratlys, long been believed to be rich in hydrocarbons. As time goes by, that belief grows. For example, the Sampaguita gasfield near Reed Bank is estimated to hold at least 3.4 trillion cubic feet (85 billion cubic metres) and perhaps as much as 20 trillion cubic feet of natural gas.

Among the casualties of the latest ructions have been football and basketball matches intended to build confidence between Philippine and Vietnamese soldiers on Spratlys they garrison. Encounters planned for April have been postponed. For now, the South China Sea seems no place for games.

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The battle for Libya

# The colonel fights back

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**Colonel Muammar Qaddafi is trying to tighten his grip on the west, while the rebels' inexperience leaves them vulnerable in the east**

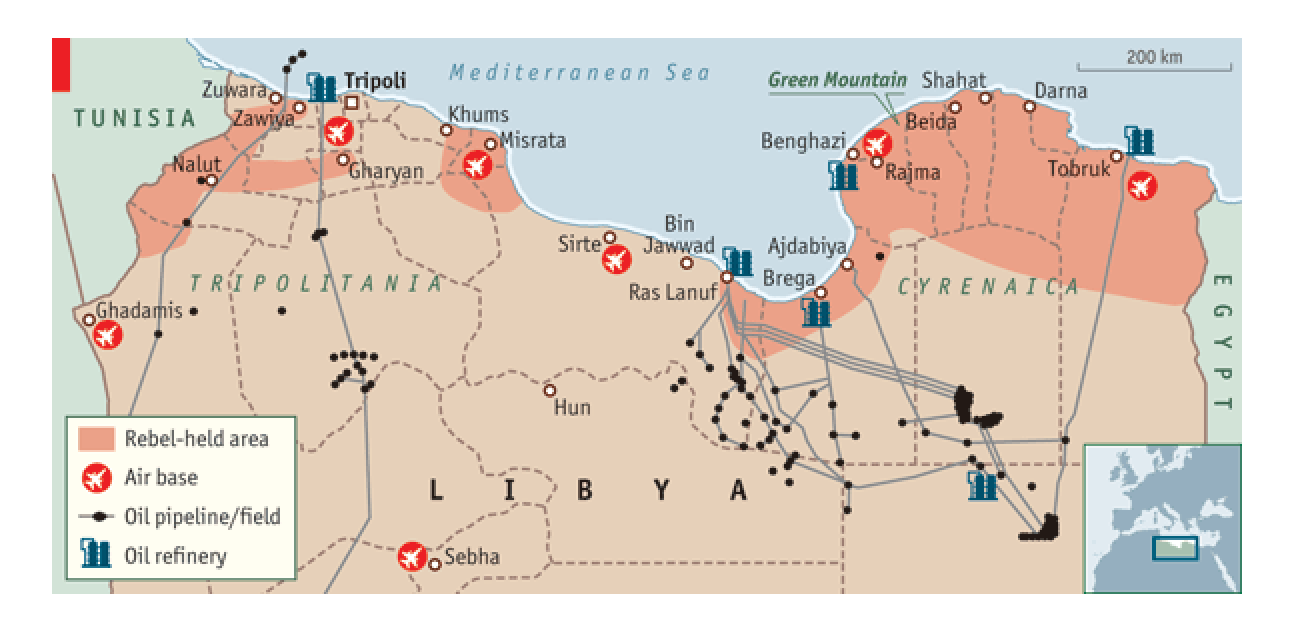



AT MIDNIGHT army pickup trucks trawl Benghazi, the rebels' main town, collecting *thawar*, or revolutionaries, for the front. Four-day veterans exhale their modern equivalent of a war-cry, a hail of anti-aircraft bullets blasted into the night sky, and bundle Ahmed Labeidi, a pint-size boy, into the truck. Almost half his class have already joined up. The minimum age for the draft has been lowered to 15. "My father told me to join my friends," he says sadly, bowing to peer pressure.

Recruits are meant to have a week's instruction before the *thawar* head west. Many get less. In a schoolyard a few score of boys, plus a pensioner who says he last held a gun 35 years ago, gather for three hours of training. They have only four guns, and the instructors are late. "Perhaps they've left for the front," says an organiser.

Instead of being taught to shoot, raw recruits are being told to take inspiration from Omar Mukhtar, a Libyan jihadist who fought (albeit in vain) against Italian imperialists in the 1920s, armed just with an ancient Ottoman rifle. Lacking in experience though they plainly are, the *thawar* have had some success. Last week they ousted the colonel's troops from two oil ports, Brega and Ras Lanuf, between Tripoli, the capital, in the west and Benghazi, the rebels' headquarters in the east. But then, as they pushed on, the rebels were ambushed at Bin Jawwad, west of Ras Lanuf, and have since taken heavy losses. Ambulances race to the front with recruits, defying orders from calmer leaders to reinforce the front line only where they are confident of holding it. "You can be a martyr fighting Qaddafi's planes here," the young recruits shout at teenage newcomers.

The colonel seems to be biding his time, consolidating his hold in the west and concentrating his superior firepower on Zawiya and Misrata, the two rebel-held towns closest to Tripoli. As *The Economist* went to press, reports suggest he may have retaken Zawiya. He may then counter-attack eastward towards Benghazi. Overall, the outcome of what has become a civil war is still in the balance. But the colonel may be recouping after his initial setbacks.




His forces are superior in numbers, weaponry and organisation, though neither side can boast much of the last. He still commands the bulk of an army that was 50,000-strong before the uprising against him began. Some 6,000 of his troops have joined the rebels, who number many thousands of volunteers but have only rudimentary equipment. Half of the deserters take orders from General Suleiman Mahmoud, based in Tobruk, north-east of Benghazi, and another 1,000 or so special forces are led by Colonel Qaddafi's former interior minister, Abdel Fatah Younis. Though both men declared their defection, they seem to be defying demands by the rebels' "national transitional council" (see article) to throw their military weight fully behind the war against their former comrades still loyal to the colonel. Perhaps they are hedging their bets. "They're playing games," says a council member.

Another 2,000-odd army defectors answer to Major Ahmed Qetrani, who sounds more whole-hearted in his support for the rebels. "He's forcing me to intervene," he says of Colonel Qaddafi from an operations room in Benghazi, after receiving the latest news of an air raid on Ras Lanuf's water tank. But even Major Qetrani seems loth to wage all-out war against Colonel Qaddafi's forces. "It would create two Libyan armies, it would make *fitna* [civil war], it would ruin our infrastructure and set our country back 100 years," he says.

Whereas the front line is thin and shaky, there is a security vacuum in Benghazi. The east-based units of army, which at first declared for the rebels, have retired to their bases and are loth to guard government buildings and institutions against pro-Qaddafi forces. "We want the army to defend the liberated cities," says a member of the national council. "But they have not been playing their part." The gates of four of the eastern zone's main arsenals have remained open since four of Colonel Qaddafi's brigades fled to the government's zone in the west. The largest, at Rajma, outside Benghazi, exploded on March 5th, reportedly killing 40 people. After the blast, young *thawar* rather than the army cordoned off the surroundings.

The police are also lying low, apparently afraid of the locals' wrath. In their absence, the *thawar* patrol the streets with police truncheons. Fear that Colonel Qaddafi may recover control over the whole country, including the liberated east, may be growing. A grenade was recently hurled into a Benghazi hotel full of Western journalists. At another hotel the senior managers have fled. Rumours are swirling of bombs to be planted near the court-house where the council meets. There is talk of plots to assassinate council members. In the eastern hinterland, rebels have hoisted the old tricolour that was the national flag before Colonel Qaddafi took power in 1969. But few of Benghazi's people are brave enough to fly it on their houses.

The rebels are patently ill-equipped. "Our tanks and artillery are derelict," says a special-forces officer who defected to the rebels. "They were kept simply for national pageants." The arms dumps abandoned by Colonel Qaddafi's forces in the east have ammunition but no guns. The rebels have only half a dozen or so out-of-date aircraft-without bombs. Grand plans for

an amphibious landing to relieve Misrata, the beleaguered rebel-held town sandwiched between the colonel's two strongholds, Tripoli and Sirte, his home town, have apparently been shelved.

Despite his superior numbers and firepower on land, sea and in the air, the colonel seems mainly to be holding back for now. After failing to recapture the oil terminals at Brega and Ras Lanuf, he has apparently laid a ring of landmines to defend Sirte and deployed a brigade there, led by one of his sons, Saadi.

After weeks of demonstrations, Tripoli is once again said to be quiet. The colonel controls Libya's western border and nearby gasfields. Much depends on the loyalty of Libya's tribes. Omar Hariri, from the powerful Farjani tribe, has been made head of the rebels' military council, in the hope of stirring strife with Colonel Qaddafi's own clan around Sirte. But the colonel has long been a master of tribal politics. He has been shoring up old alliances, not least by taking male hostages from the main tribes, including the Warfalla, the largest, with an implicit threat that he may kill them if their tribes rise up. The *thawar* say the colonel is using women and children as human shields on the front line; if they are killed, tribal codes will require their relatives to turn on the rebels. As the rebels' dream of conquering Tripoli unaided fades, their other aim, to hold fast in the east, may begin to look optimistic too. Rebel leaders speak with foreboding of the prospect that, once the colonel has recovered his grip in the west, he may turn his tanks and aircraft to the east.

Calls by the rebel council for foreigners to come to the rescue, muted a week ago, sound increasingly desperate. Most easterners strongly oppose the idea of friendly foreign troops on the ground, but pleas for air raids against Colonel Qaddafi's base in Tripoli-and for a no-fly zone imposed by the West-have become a lot louder.

Britain and France are tilting towards an outright demand in the UN Security Council for a no-fly zone, but the Americans are still hesitant and the Russians against. The outcome of this debate could decide the fate of Libya and its dogged colonel.

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Libya's fledgling alternative government

# Who's in charge?

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**The opposition must get a grip, fast**

IF THE Libyan rebel movement in the east is to survive, it needs international recognition soon. France was first to give it; the European Union was due to discuss the matter urgently on March 10th-11th. But the rebels' interim national council in Benghazi, in the east, has yet to present a clear identity to the world, nor has it persuaded foreign companies to treat with it as Libya's legal authority.

Basic communications are still tricky. Colonel Qaddafi has switched off the internet and prevented the east from getting petrol supplies, so its transport system may falter. Without income from oil, the rebels' council could run out of cash. Most public-sector workers in the east have not been paid for a month, bar a one-off loan.

In theory the rebels could sell oil directly to anyone willing to buy it. They control the lion's share of the oilfields and the main oil-exporting ports. Libya's biggest oil company, the Arabian Gulf Oil Company, better known as Agoco, is based in Benghazi, the rebel headquarters, and has given its allegiance to them. But without an internationally recognised legal authority, it cannot sell oil. "We're not pirates," says one of Agoco's managers.

Three senior diplomats, including Libya's former ambassador to the UN, answer to the nine-member council. But foreign governments have so far dithered, expressing concern and offering humanitarian aid rather than recognition. And little aid has actually been sent. Turkey, for example, has delayed sending a promised ship. It may fear that, if Colonel Qaddafi were to recover power, it would lose its huge contracts for building ports, sewage systems and a giant water project.

The rebels' lack of organisation has not helped their cause. Scenes of bearded irregulars storming oil compounds have made Western companies nervous, lending credence to the colonel's claim that without him jihadists might grab the oilfields. Some of Libya's secular exiles sound edgy and have been slow to return home.

The protesters have turned the Benghazi courthouse, the council's seat, into a revolutionary commune, replete with barricades, soup-kitchens and graffiti. "It was a mistake to rush to war," says a council member. "We tried to stop them but their brothers and friends had been killed, so they were too angry to stop."

The council has sought to present an image of unity, saying it stands for all of Libya's professional bodies, tribal federations and ethnic groups, including Berbers and Tuaregs. At a big personal risk, civil servants, postal workers, port officials and oil men have stayed patiently loyal to the fledgling government in the east. But among the populace at large the exhilaration of freedom may be fading. Smokers in cafes are switching the television screens from news to sport.

Inside the courthouse, differences are sharpening between the liberals, led by the Benghazi lawyers who launched the first protests, and the traditionalists, led by Mustafa Abdel Jalil, the colonel's former justice minister who enjoys both Islamist and tribal support. Whereas the lawyers treat Mr Abdel Jalil as a figurehead, he reckons he is the new president.

Although the liberals want Colonel Qaddafi to depart forthwith, Mr Abdel Jalil says his offer to negotiate should be considered. "He should be given 72 hours to leave," he told Al Arabiya, an Arabic satellite-television channel; his friends have suggested that the colonel be given immunity from prosecution if he steps down. The lawyers want him brought to justice.

Still, hopes of renewal and reform are still alive. Political outfits, which were banned wholesale under Colonel Qaddafi, have sprung up. "He who engages in political parties is a traitor," declares his Green Book; unauthorised gatherings of more than three people were termed conspiracies. But now, in front of the courthouse, new groups stage debates late into the night. Teachers demand the right to form a union. Survivors of Abu Salim prison in Tripoli, where the colonel had more than 1,200 inmates shot in 1996, publicise the abuses they suffered; students perform comic sketches of Qaddafi and Sons.

The Muslim Brotherhood seems to be the best organised party, winning recruits through a revived presence in mosques, a conduit the liberals lack. It says it wants a parliamentary democracy, albeit with a religious slant. But there are reports that jihadists have joined the movement. Western governments are unsurprisingly wary of fully endorsing the fledgling council, unsure of whom it represents. Yet without recognition, the council may struggle to entrench itself, at home or abroad.

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Iran's battered opposition

# A leadership neutered

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**A trio of opposition leaders seems to have been squashed, at least for now**




HE WAS the beardless mullah who hurled thousands of soldiers to their deaths during the Iran-Iraq war of the 1980s. He was a kingmaker, arranging for his candidate to succeed Ayatollah Ruhollah Khomeini, the Islamic Republic's first supreme leader, after his death in 1989. Finally, he was a ruthless but pragmatic president who accumulated Croesus-like wealth. Now, at 76, rejected by the establishment he once ruled, Akbar Hashemi Rafsanjani (pictured) has become just another wistful revolutionary, singed by the flames he once fanned.

His exit from public life has been engineered with clinical precision. His enemies in Iran's tightly controlled media united to press him to stand down from the chairmanship of the Assembly of Experts, a high-powered body of jurists whose job is to choose the supreme leader and sack him if need be. On March 8th, when the assembly met to choose a new head, Mr Rafsanjani duly said he would not stand for re-election. He invoked a desire to avoid "disagreement"-an allusion, perhaps, to his expectation that he would lose a leadership vote. He would now devote himself to writing his memoirs. "The people should expect nothing more from me."

The expectations of "the people"-or, rather, supporters of the country's pro-democracy Green Movement-were raised when Mr Rafsanjani emerged as the arch-enemy of Iran's hardline president, Mahmoud Ahmadinejad, six years ago. Then, in the summer of 2009, after a flawed election that returned Mr Ahmadinejad to power, Mr Rafsanjani gave an historic sermon in which he sided with the millions of Iranians who had taken to the streets to protest against the results. His popular image was transformed-but at a price.

For the man Mr Rafsanjani had manoeuvred into the supreme leadership all those years ago, Ayatollah Ali Khamenei, the sermon marked the definitive end of a souring relationship. Since then, the pressure on Mr Rafsanjani and his family has become unendurable, with an arrest warrant for one son (in London), his daughter subjected to a public bullying by pro-regime militants, and a concert of media abuse aimed at trashing his record.

It is possible that the anathemisation of Mr Rafsanjani will have an unintended effect. A few months after the discredited poll of 2009, one of his sons confided that his father no longer thought much about power or wealth, but about how he would be remembered. He may not have the stomach for a fight that has also, in recent weeks, cost the freedom of the Green Movement's two main figureheads.

Mir Hossein Mousavi and Mehdi Karroubi were both subjected, like him, to media vilification, followed in their cases by physical intimidation, confinement to their homes and then, quietly last month, arrest. The government now says the duo are back home, albeit denied access to the outside world, but on March 2nd thousands took to the streets of Tehran to demand their release, before tear-gas and baton-charges were used to disperse them.

The struggle for Iran's future is turning out to be a long-drawn-out affair. The truth is that Mr Mousavi and Mr Karroubi were not iconic enough for their arrest to signal the end of the Green Movement or to prompt a sustained wave of mass anger. The more cautious Mr Rafsanjani will not court arrest. But he retains the satisfaction of believing that, in the end, he came down on the side of right.

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Turmoil in Cote d'Ivoire

## Will the bad loser be squeezed out?

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**An economic noose is slowly tightening around Laurent Gbagbo's neck**




WHILE the rest of the world's attention has been fixed on the upheavals to the north, the crisis in Cote d'Ivoire, France's former colony in west Africa, has been getting rapidly nastier. Since a disputed presidential election in late November, some 400 people have been killed and hundreds of thousands have fled their homes, many of them in the past fortnight. The UN, the African Union (AU) and the Economic Community of West African States (ECOWAS) have all recognised Alassane Ouattara, the former opposition leader, as the winner and new president. But the former incumbent, Laurent Gbagbo, is still clinging grimly to power.

For the past three months, Mr Ouattara, a former deputy-director of the IMF, has been holed up with his entire newly appointed government, unable so far to exercise power, in the Hotel du Golf in Abidjan, the commercial capital, protected by some 800 UN peacekeepers, who provide his lifeline to the outside world. But this week he left his redoubt for the first time to attend a meeting of the AU's peace and security council on March 10th at the body's headquarters in Addis Ababa, the Ethiopian capital, where his excited aides expect him to be officially consecrated as president by his peers and Mr Gbagbo dumped.

Even if that happens, Mr Gbagbo is unlikely to go quietly. He too is holed up-in the presidential palace, not far from the Hotel du Golf, protected by his loyal Republican Guard and 300 soldiers lent to him by Angola's president, Jose Eduardo dos Santos, one of Africa's long-serving "big men" still loyal to him. Mr Gbagbo refused to go to the Addis Ababa meeting, perhaps afraid that he would be prevented from coming back.

But the noose around his neck may be tightening, mainly for economic reasons. The state is running out of cash. Most of its funds are blocked in a central bank in Dakar, the Senegalese capital, where the seven other Francophone west African countries that use the currency of the African Financial Community (better known as the CFA franc) have cut off all financial links with Cote d'Ivoire. All foreign banks in the country have also closed their operations, freezing not only the government's funds but also those of private clients. It is no longer possible to use cheques or credit cards or to make bank transfers. Everything has to be paid for in cash. Employers cannot pay their suppliers or employees. Shops, markets and petrol stations are still busy but may soon run out of supplies. Some medicine is becoming scarce.

Though most of the generals seem loyal to Mr Gbagbo, he knows that around two-thirds of the forces' rank and file voted for Mr Ouattara. Unless their wages continue to be paid, many may defect. This week thousands of civil servants queued under the pitiless tropical sun to collect their February wages from the small state-owned banks that remain open. The former president proclaimed proudly that 62% of them had been paid, though not in full. The other 38% can hardly be happy.



Gbagbo must go

Last month he announced that he had "nationalised" all the foreign banks: a meaningless gesture, since all their funds had been frozen by a flick of a computer switch in foreign capitals. This week he announced he had also "nationalised" the cocoa and coffee industries, the Ivorian economy's mainstay. But since the European Union and the United States, the country's largest trading partners, have imposed economic sanctions, he will find it hard to find buyers to process the raw commodities. His friend, President dos Santos, is said to have extended him a lifeline by lending him a lump of cash.

Meanwhile, boosted by events in Tunisia and Egypt as well as by Mr Gbagbo's growing weakness on the diplomatic and economic fronts, the New Forces, the still heavily armed former rebel movement that is now backing Mr Ouattara, are growing in confidence. Already in control of the mainly Muslim north since the civil war of 2002-03, they have recently

been fighting fiercely against Mr Gbagbo's forces in the west, near the border with Liberia. Many of the dead on his side have turned out to be mercenaries from neighbouring Francophone countries, increasing the suspicion that Mr Gbagbo can no longer count on the loyalty of his own forces. Mr Ouattara's spokesman says that as many as three-quarters of them have already deserted. Some outside observers suggest that even more may have done so.

Last year's presidential elections, repeatedly postponed in the previous five years, were supposed to restore a degree of peace and stability to a country that in its post-colonial heyday under Felix Houphouet-Boigny had been considered the jewel of west Africa. Instead, they have increased the social, economic and political turmoil that has ravaged the country since the old man's death in 1993.

No one is sure how it will all end. Most agree that Mr Gbagbo will not easily be displaced. Some think the street violence will worsen, perhaps ending in a bloody showdown. Others guess that, once cornered, Mr Gbagbo will opt for exile in a friendly country beyond the reach of the International Criminal Court at The Hague, which already has its eyes on him. The UN has 10,000 soldiers and police in the country and is expecting another 2,000. But its mandate empowers it only to protect civilians and to monitor a supposed ceasefire. Unless the rules are changed to allow them to do more, its peacekeepers cannot intervene robustly against Mr Gbagbo. Despite some warlike noises emanating from ECOWAS and especially its beefiest member, Nigeria, it seems unlikely that African governments would risk an attempt to topple Mr Gbagbo by force.

As *The Economist* went to press, the AU was searching anew for a diplomatic solution. Some of the body's leading lights have aired the idea of a power-sharing agreement, as in Kenya and Zimbabwe after disputed elections. Mr Ouattara is understood to be willing, for the sake of national unity, to include some of Mr Gbagbo's ministers in his government, as long as Mr Ouattara himself is clearly in charge and his predecessor clearly sent packing. He may yet have a long struggle ahead. But time, it seems, is against his rival.

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Happy but unequal Namibia

# On we go

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**Swapo rules and harmony prevails**

ON THE face of it, Namibia, governed for 75 years by neighbouring South Africa, is one of Africa's political and economic successes: a middle-income developing country with rich natural resources, good infrastructure, gorgeous landscapes, a stable and democratic government, harmonious race relations, a free press and an economy that has grown on average by 4.2% a year since independence in 1990.

With a population of just 2.2m rattling around in a country one-and-a-half times the size of France, the former German colony of South West Africa is one of only nine African countries classified as free by Freedom House. In that Washington-based think-tank's most recent "Freedom in the World" survey, it gets the second-highest mark (2 out of 7) for both political rights and civil liberties. In the latest index of good governance in Africa published in London by the Mo Ibrahim Foundation, it comes sixth out of 53 countries.

Yet the UN Development Programme suggests that, by some calculations, Namibia is the world's most unequal nation. Go to the capital, Windhoek, or Swakopmund, the main sea resort, and you could be forgiven for believing you were in a rich little European town: neat, well-paved streets lined by elegant high-rise hotels and banks, smart boutiques, outdoor cafes

and pretty little homes painted in the colours of the Namib desert-ochre, pale yellow, salmon pink. But drive a bit further out and you find overcrowded black townships and beyond them the sprawling shanty towns where the dirt-poor live in leaky corrugated-iron shacks with no electricity, running water or sanitation. It is much the same elsewhere in Africa, but in Namibia the difference is more extreme.

Since independence in 1990, after a 23-year war of liberation, Namibia's GDP per head has doubled in real terms, yet the poverty rate, according to the World Bank, is the same. Two in five Namibians live on less than $1.25 a day; 60% continue to eke out a living as subsistence farmers. The official unemployment rate stands at 51%, up from 37% at the time of the most recent labour survey, in 2004; two-thirds of those under 25 have never had a job. Matters have been made worse by HIV/AIDS. At the peak of the epidemic, in 2002, 20% of Namibians aged 15-49 were infected. The adult prevalence rate has since fallen to 15%, thanks to an education programme and antiretroviral drugs.

Moreover, unlike South Africa, which also suffers from a high HIV/AIDS rate and extremes of inequality, Namibia has no comprehensive welfare system to alleviate the plight of the poor. In Namibia AIDS orphans are eligible for a means-tested grant of 200 Namibian dollars ($29) a month and anyone over 60 is entitled to a monthly state pension of 500 Namibian dollars, though with life expectancy averaging 52, few live long enough to get it. But that is about all. The trade unions have been pressing for a basic income-support grant of just 100 Namibian dollars. But even at that level, the government does not seem prepared to act.

However, despite the poverty, inequality and growing corruption, Swapo (formerly the South West Africa People's Organisation but now officially just plain Swapo), the former liberation party, which has ruled the country since independence, remains popular. Many whites, who account for 6% of the population, applaud it too. The country is stable. Foreign investment is pouring in.

Sam Nujoma, the party's avuncular founder and Namibia's first president, who stepped down in 2005, is particularly revered. Now in his 80s and said to be suffering from prostate cancer, he is the power behind the throne of his successor and former protege, Hifikepunye Pohamba.

Even the younger generation, with little memory of the anti-colonial struggle, does not seem to be itching for change. At each of the past three elections, all generally deemed fair, Swapo has scooped up three-quarters of the vote. Some thought the Rally for Democracy and Progress (RDP), which split from Swapo in 2007, might have challenged the ruling party's dominance. But it won only 11% of the vote last time round, in 2009, and even less in November's local elections. No other party got more than 3%.

Some think Swapo might break into warring factions when Mr Nujoma dies. But its internal discipline is strong. Except in the media, there is little real opposition. So the ruling party seems set to stay in power for a long time yet.

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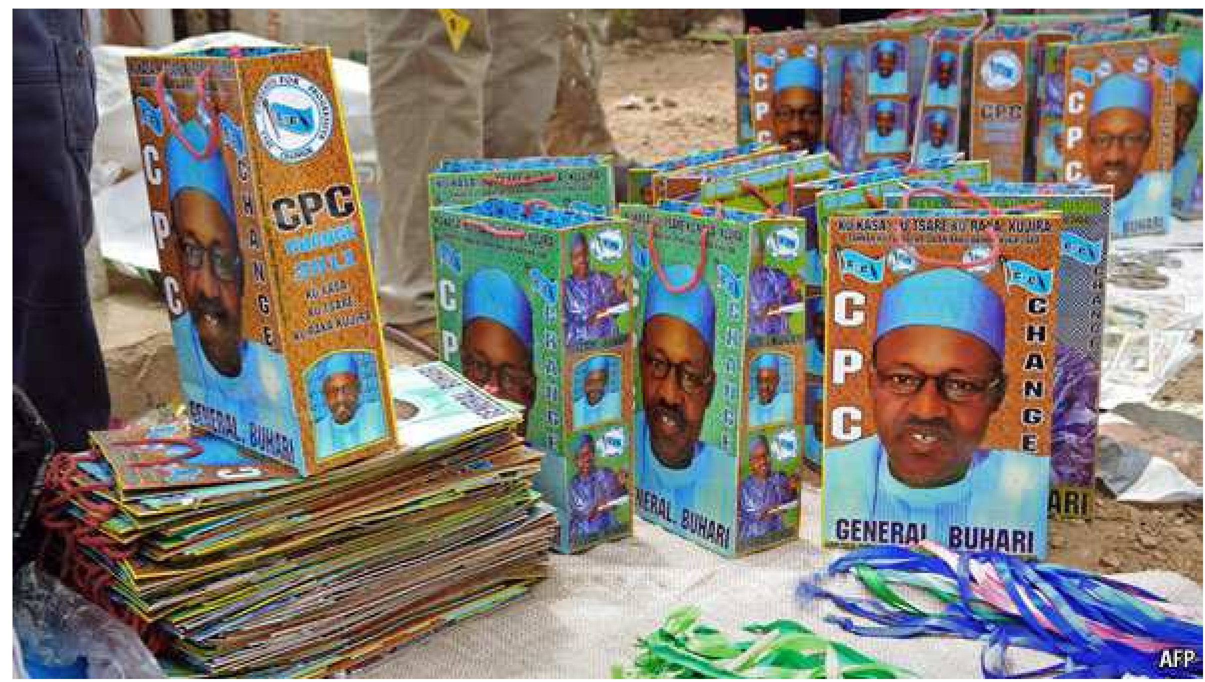
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Nigeria's election line-up

# A three-way contest

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**As elections loom, a line-up of leading candidates takes shape**



A convert to the delights of democracy

IN LESS than a month Nigeria will hold elections that may be the most unpredictable since military rule ended in 1999. Voting for president, parliament and state governors will take place on three successive Saturdays, starting on April 2nd. Personality and the power of patronage, rather than policies, will decide the winners.

In normal circumstances Goodluck Jonathan, the candidate of the ruling People's Democratic Party (PDP), would be expected to win easily. The PDP has won every presidential poll since the army bowed out. Nigerian elections favour the incumbent, who has access to the state's vast oil revenues and can dish out cash, contracts and appointments. Mr Jonathan, a former vice-president who took over last May when Umaru Yar'Adua died, also won the financial backing last month of some big bankers and telecoms tycoons.

But Mr Jonathan, an unassuming zoologist who hails from the oil-rich southern delta, owes his rise more to luck than design. Moreover, he has flouted the PDP's so-called zoning pact, whereby the candidacy for president rotates every two terms between the largely Christian south and the mostly Muslim north. The PDP now faces a struggle to woo the northern electorate, which makes up over half of the country's 73.5m registered voters. Opposition candidates are thus gearing up for what they see as their first chance in a proper race. Two frugal northerners present a contrast-and hope to pose a threat-to the president.

Mr Jonathan's main challenger is Muhammadu Buhari, a former military ruler, who is running with the Congress for Progressive Change (CPC). General Buhari is best known for launching a "war on indiscipline" after taking power in a coup in 1983 and ruling for just over 18 months. Looting politicians were jailed, drug-traffickers executed and public spending sharply cut. General Buhari even tried to have an allegedly corrupt official who had fled abroad drugged and flown back to Nigeria in a crate.

The former dictator says he is a convert to democracy. "I don't believe [anything else] is acceptable any more to ordinary people," he says. "Nigerians have got the message after seeing what is happening in north Africa and the Middle East." He has chosen Tunde Bakare, a southern Pentecostal pastor and pro-democracy activist, as his running mate. General Buhari's tough stance on graft is winning him support, especially among poor northerners. When he launched his campaign in the northern city of Kaduna this month, close to his birthplace of Daura, youths climbed on to car roofs to watch him speak.

Mr Jonathan's other rival is Nuhu Ribadu, a northerner who used to run the country's anti-graft agency. He is running with the Action Congress of Nigeria (ACN), which controls Lagos, the vibrant commercial capital. Mr Ribadu, the youngest of

the three main candidates, and his running mate, Fola Adeola, a southern banker and philanthropist, are the progressive choice. "We have youth on our side and we are not ex-military people," says Mr Adeola. "We are closer to the Nigerians who own the future." Their main support is among Nigeria's small middle class.

Since the PDP is so dominant, Mr Jonathan is still the favourite to win. Some predict a run-off against General Buhari. But the ruling party faces a tougher battle to keep control of the 27 states it runs out of Nigeria's total of 36. Some northern ones could fall to General Buhari's CPC, while Mr Ribadu's ACN is gaining ground in the south-west around Lagos. Mr Jonathan will need the backing of these powerful governors if he is to push through reforms during his tenure. Indeed, he may find it easier to win than to rule.

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The European Union and the euro zone

# Outs and ins

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**How the euro-zone outs are fighting to retain influence in the European Union**




ONE fear of European Union members outside the euro, either by choice or because they are not ready to join it, has been that they will be cut out of the big decisions being taken in Brussels. One hope of many of the euro's founder members was the obverse: that the club would become more politically and economically integrated. That original tension between wide consultation and tight integration is now bubbling over in arguments over whether the euro-zone heads of government should have regular summits.

**Poland**, a leading euro "out", was horrified when a leak revealed internal German correspondence on the "competitiveness pact" proposed by Chancellor Angela Merkel and the French president, Nicolas Sarkozy. This confirmed the danger of a two-speed Europe that locked out non-euro countries and sidelined the European Commission. Yet Poland sees Germany as its best friend in the EU.

The Polish prime minister, Donald Tusk, made his dismay thunderingly clear (see Charlemagne). He has got somewhere as a result. "At the European Council, Tusk never gets angry; he's trusted and a credible negotiator," says Piotr Kaczynski of the Centre for European Policy Studies in Brussels. "So on the occasion when Tusk does shout, Brussels stops." The compromise "pact for the euro" makes concessions, including a role for the commission.

The Poles will continue to fight plans to move decision-making from the 27 to the 17, accepting the smaller group only for matters directly related to the euro. But they like the competitiveness pact's structural reforms, such as reforming wage indexation. Jacek Rostowski, the finance minister, says "it's good if all Europe wants it, not just something for emerging economies." And there is some scepticism about the ability of 17 very different euro-zone countries to agree on new policies.

Poland plans in principle to join the euro. The fear of isolation is keener in **Denmark** and **Sweden**, which want more say but are unlikely to join the single currency for a while. The adoption of the euro by such new members as Slovenia, Slovakia and now Estonia was a reminder of their dwindling influence. "It really rankles that they can't get into important policy meetings," says an Estonian diplomat.

In fact the centre-right coalitions of Sweden and Denmark, unlike their counterpart in **Britain**, are eager to adopt the euro. But their voters are not persuaded. The Danes have twice voted against joining, once in a referendum on the Maastricht treaty in 1992 and again when they were asked to reconsider in 2000. Swedish voters similarly rejected the euro in a 2003 referendum. Now the risk of a two-speed EU, with Sweden and Denmark in the outer lane, has led to speculation about fresh referendums in both countries.

The Danish prime minister, Lars Lokke Rasmussen, floated the possibility earlier this month, arguing that Denmark should ratchet up its European commitment before it takes over the EU's rotating presidency next January. But the timing could hardly be worse. One opinion poll in February suggested that voters might agree to scrap their opt-outs (from judicial and security co-operation as well as the euro) only if all three were dealt with in a single referendum. And this was a rare positive blip in an anti-euro trend. A December poll by Denmark's Danske Bank found fully 43.5% were definite noes and only 25.5% certain yeses-an 18-point lead. "I don't believe the prime minister will call a referendum; the risk of a no is too high," says Steen Bocian, the bank's chief economist. Another complication is that Denmark must hold a general election by November-and Mr Lokke Rasmussen is trailing in the polls.

The travails of the single currency have hardened anti-euro sentiment in Sweden too. Danes fear that without the krone they might have sunk into an Irish quagmire. Swedes are proud that their economy has thrived on the outside. Far from being in the slow lane, in the fourth quarter of 2010 it was the fastest-growing in the EU. For now, Sweden and Denmark will remain out. Their governments will back Poland in resisting a bigger role for the euro group.

On the face of it, the prospect of regular euro-zone summits is a setback also for **Germany**. Economic government was a French idea, loaded with dirigiste menace and peril for the independence of the European Central Bank. Mrs Merkel has always been the sworn enemy of class distinctions within the EU. In 2008 she rejected calls for a two-speed Europe when Irish voters rejected the Lisbon treaty. "The unity of Europe is not something we want just for its own sake," she declared. "It is a great good." Moves in the direction of a euro-zone economic government look like a climbdown.

Mrs Merkel would deny this. No new club is being formed, and any arrangement cooked up by the 17 will be open to the ten non-euro members as well. Far from opening a dangerous new division within the EU, the Germans think they are closing one: between competitive economies and the laggards that threaten the survival of the euro. If they have their way, this euro-zone summit may be the last.

From Mrs Merkel's point of view, the alternative was worse. Germany may have as much as euro200 billion ($280 billion) of exposure to rescue schemes for wobbly euro members and that figure could climb. So will resistance from voters and some members of Mrs Merkel's coalition. The euro has become the top political issue, says Frank SchÃ¤ffler, a hawkish Bundestag member from the liberal coalition party, the Free Democrats. The pact for the euro is supposed to help by

breaking euro countries of the bad economic habits that got them into trouble in the first place. "She needs something to take to her increasingly sceptical coalition," observes Daniela Schwarzer of the German Institute for International and Security Affairs. Not all are reassured. Mr SchÃ¤ffler sees the pact as a "placebo to quiet the people." European countries should compete rather than being forced to reform by a central authority, he thinks. Hans-Werner Sinn, a liberal economist, fears that France may use a euro-zone government to force Germany to raise wages.

Mrs Merkel's allies are awkwardly positioned between backing her diplomacy and setting limits on German concessions. On February 23rd the three coalition parties laid down conditions for approving a treaty change to set up a permanent euro-zone bail-out fund. One was more economic co-ordination within the zone-in other words, a version of the competitiveness pact and its embryonic economic government. Mrs Merkel may have long opposed a two-speed Europe, but pressure from voters, her coalition partners and other euro-zone countries seems to be pushing her into tolerating it.

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The trial of Jacques Chirac

# Silence in court

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**A postponement raises fresh concerns about political impunity in France**



They'll never get me

THE closer Jacques Chirac gets to the courtroom, the less likely it seems that the former French president will ever truly be held to account. For two decades, investigating judges have compiled the evidence to bring Mr Chirac to trial for corruption when he was mayor of Paris, in 1977-95. This week, when he was due in court, an unprecedented event for the fifth republic, the judge suspended the case for three months on a technicality.

Mr Chirac is charged with "misappropriation of public funds", using fake jobs paid for by the Paris town hall. As mayor, he built his Gaullist party into an electoral machine that won him the presidency in 1995. Many town-hall employees worked for the party. The trial involves two separate cases, 28 bogus jobs and nine co-defendants. If convicted, Mr Chirac could face ten years in jail.

Of all the efforts to finger Mr Chirac, this is the only one to reach court. Others have been shelved because of the statute of limitations or because of the presidential immunity that Mr Chirac enjoyed until 2007. Some were more serious than the bogus-jobs case, notably two involving a system of kickbacks on public contracts from the town hall for which many former colleagues were convicted. Other inquiries went unresolved, such as one into FFr 2.4m ($480,000) of travel-agency bills mysteriously paid in cash by the Chirac family.

This trial is thus the judges' last chance. That party employees were on the town-hall payroll has been established. In 2004 Alain Juppe, Mr Chirac's former right-hand man (now the foreign minister) was convicted in one fake-jobs case. Last year Mr Chirac even agreed to reimburse the town hall euro500,000 ($695,000), with the ruling UMP party chipping in another euro1.7m; in return, the current (Socialist) mayor, Bertrand Delanoe, withdrew the town hall as plaintiff. Mr Chirac has said he is ready to appear in the dock and has nothing to hide.

Yet this week's ruling adds to the sense that, when it comes to Mr Chirac, the judicial system keeps stalling. The armchair especially installed for him in court stood empty. The case was brought by civil plaintiffs, against the advice of the public prosecutor. This week's technical appeal by one of Mr Chirac's co-defendants, querying the statute of limitations in one case, will go to a higher court that has three months to decide whether the appeal is founded, in which case it will go to the Constitutional Council, France's highest judicial authority.

The French seem oddly ambivalent about trying an ageing ex-president (he is 78) in uncertain health. In retirement he has become a national treasure, thanks partly to his stand against the Iraq war. Even the opposition has misgivings about pursuing Mr Chirac. Yet this week's postponement has stiffened resolve. Arnaud Montebourg, a Socialist deputy, insists that Mr Chirac "has to face up to his judicial responsibilities". Even if the chances of Mr Chirac ever seeing the inside of a prison cell are zero, there is a sense that with him in the dock stands France's culture of political impunity.

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Silvio Berlusconi's future

# Trials and tribulations

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**Despite his legal worries, the Italian prime minister is looking safer in his job**

IF THE skipper leaves the bridge, it is safe to assume the ship is not about to founder. On March 7th it emerged that Italy's prime minister, Silvio Berlusconi, had undergone extensive surgery. His doctor said the operation was to put right injuries to Mr Berlusconi's jaw and teeth from an attack by a mentally disturbed assailant in late 2009. The 74-year-old prime minister spent four hours under the knife.

There have been moments in the past 20-odd months, as Mr Berlusconi's woes piled up, when it would have been unthinkable for him to slope off. But recently, even as his legal difficulties have mounted, his political fortunes have improved.

By April 6th the prime minister, who denies any wrongdoing, will have gone on trial (or been put back on trial) three times. The charges he faces include tax fraud, bribery, paying for sex with a 17-year-old girl and abusing his position to get her out of a scrape. Yet although Mr Berlusconi's poll ratings have fallen (a majority of Italians now say he should resign), his political position is looking more secure.

On March 2nd the lower-house Chamber of Deputies approved a confidence motion, tabled by the government to improve the chances of a bill giving local authorities more financial autonomy. The government's majority was 23, up from only three in mid-December. Opposition leaders claim that the balance in the legislature has been altered through offers of cash or jobs by officials from Mr Berlusconi's People of Freedom (PdL) party, something the PdL firmly denies.

What is clear is that several parliamentarians who left the (PdL) in a revolt last year by his former lieutenant, Gianfranco Fini, have repented. Yet unless the rebellion is altogether undone, it will still have consequences. Mr Fini, whose power base is in the south, was a counterweight to the PdL's coalition ally, the Northern League, which wants to ensure that the richer north hangs on to more of its taxes. His departure leaves Mr Berlusconi entirely dependent for survival on the League and its canny leader, Umberto Bossi.



Browse an

The League's influence may explain Mr Berlusconi's tepid approach to next week's 150th anniversary of Italian unification. Only after much hesitation did his cabinet declare March 17th, the day chosen for the anniversary, a public holiday (the League's ministers voted against). As if to acknowledge his allies' clout, Mr Berlusconi appeared for the vote on March 2nd sporting a handkerchief in the vibrant green that is the League's party colour.

The vote guarantees the implementation of a key part of the League's programme of fiscal federalism. The concept was endorsed by parliament in 2009. But the legislation needed to implement it is contained in eight decrees, of which four have now been approved. The most important remaining one deals with decentralisation to the regions and provinces. Luca Antonini, who chairs the technical committee that advises the government on fiscal federalism, says the entire process should be completed by the end of May.

What then? The League's voters (many of them devout Catholics) will get weekly exposure to evidence gathered by prosecutors to support charges that Mr Berlusconi is a crooked businessman with an outlandishly sleazy private life. Even Mr Bossi may conclude that keeping such a man in office is unwise. But, having steered the League so far to the right, it is hard to see how he could join an opposition dominated by the centre-left Democratic Party. In short, the two men may be inextricably bound together: in good times and in bad and, as Mr Berlusconi may have reflected this week, in sickness and in health.

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Press freedom in Turkey

# A dangerous place to be a journalist

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**More arrests stoke fears that the government is intolerant of criticism**




Let our people go

RECEP TAYYIP ERDOGAN, Turkey's mildly Islamist prime minister, likes to boast that his Justice and Development (AK) party has transformed the country into a "forward democracy". But the detention and imprisonment of two investigative journalists on March 6th looks very much like a step backwards.

The arrests of Ahmet Sik and Nedim Sener came at a time of growing concern about pressure on the media. Scores of journalists, many of them Kurds, are in jail. The European Union and America say they are worried. Thousands of Turks took to the streets in protest after the arrests.

Mr Sik and Mr Sener have been accused of involvement with the so-called Ergenekon gang, an organisation of generals and like-minded accomplices alleged to have plotted to overthrow AK. The investigation into Ergenekon, which began in 2007, marks the first time that serving generals have been called to account by civilians (albeit in controversial special security courts), and has offered an unprecedented glimpse into the army's murky past.

Yet even AK's biggest fans worry that the legitimacy of the Ergenekon case is being dented by heavy-handed tactics such as the arrests of Mr Sik and Mr Sener. Four years after the investigation began there have still been no convictions. Some suspects have yet to be charged. The investigation, say some, has become a mere pretext to round up the government's critics. Last month police raided the offices of OdaTV, a website, and arrested three journalists on suspicion of inciting a coup.

Some argue that Turkey's most influential Islamic brotherhood, led by Fethullah Gulen, a Pennsylvania-based imam, can be seen behind the recent wave of arrests. Nonsense, say Gulenists. Their movement is widely acknowledged as a moderate force. But critics claim that their penetration of the state, notably the police, has given them free rein to pursue their foes in the army and elsewhere.

Both journalists arrested last week had produced works that may have brought them enemies. Mr Sener is best known for a book that documents the complicity of the police in the 2007 murder of Hrant Dink, a Turkish journalist of Armenian origin. At the time of his arrest Mr Sik was about to publish a book on the influence of the Gulenists within the security forces. "Whoever touches [them] burns," Mr Sik shouted as he was arrested.

Zekeriya Oz, the chief Ergenekon prosecutor, said the pair were arrested not because of their writings but because of "other activities" that he was, for the time being, "unable to reveal". Yet leaked transcripts of their interrogations show that Mr Oz grilled them about several books, including one written by a former police chief, Hanefi Avci, which also attacks the Gulenists. (Shortly after its publication, Mr Avci, a self-avowed religious conservative, was imprisoned for his alleged membership of an obscure left-wing faction.)

Emma Sinclair-Webb of Human Rights Watch, an advocacy group, points out that the use of secret evidence means that defendants cannot challenge their detention. The longer it remains secret, the louder the protests are likely to be.

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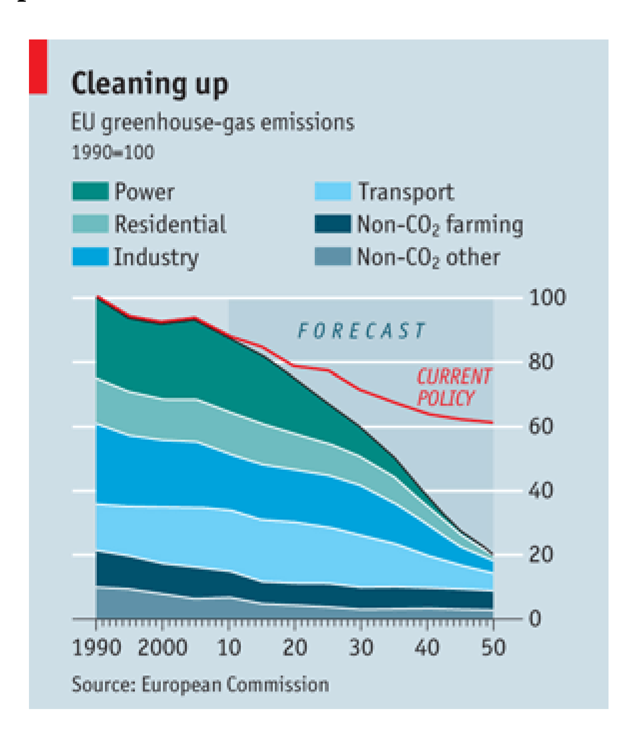
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Europe's climate policy

# Being ambitious

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**The European Commission maps a path to a low-carbon future. Now to walk it**




ABOUT half Europe's electricity comes from fossil fuels, with $CO_2$ emissions as an unwanted by-product. By 2050, proposes a "road map" released by the European Commission this week, all that gassy baggage must go. Believing that global greenhouse-gas emissions must fall by half to limit climate change, and that rich countries should cut the most, Europe has set a goal of reducing emissions by 80-95% by 2050. The road map is its first stab at sharing out the cuts (see chart).

Since some greenhouse-gas emissions, such as those from farming, are hard to curb, this target means that $CO_2$ from power generation must shrink almost to nothing-even as electricity production ramps up by 50% to provide more juice for electric cars and a lot more houses. Providing most of that energy from wind, sunshine, plants and rivers, along with a bit of nuclear, is possible. The biggest technical caveat is that most studies include a lot of fossil-fuel plants in which $CO_2$ is whisked out of chimneys and tucked underground without troubling the atmosphere, and this capture and storage technology has yet to be proved on the scale needed.

The plan requires a lot of investment in power generation and smarter grids, best done in the context of-at long last-a reformed and competitive energy market. The commission says the investment required to decarbonise power would average about euro30 billion ($42 billion) a year over 40 years. This is one of the cheaper parts of the plan; the total cost is about euro270 billion a year, with euro80 billion going on buildings and appliances and euro150 billion on transport. But the commission's modelling also points to savings on fuel costs, which are low for nuclear and zero for most renewables, of between euro175 billion and euro320 billion. Other benefits include more energy security and cleaner air.

Some governments, including France's and Britain's, are so convinced of the benefits of green investment that they think the commission's near-term goal of a 20% emission reduction by 2020 is too low. They want it raised to 30%. Others argue strenuously for the limit to be kept as it is, as do some industry lobbies. The road map says that an optimal path would require a larger cut by 2020-but that, as luck would have it, the optimal reduction, set at 25%, is what will be realised by existing plans for more renewable energy and improved energy efficiency if they work out.

One problem with this is that the efficiency goal of a 20% improvement by 2020 seems high. The commission says the EU is on course to do only half as well. In an energy-efficiency plan released with its road map, the commission talks of making the goals binding in 2013. And if the targets are met, the carbon market may suffer. The number of permits to be issued to carbon emitters from 2013 to 2020 has already been fixed. Hitting the energy-efficiency targets would reduce demand for those permits, in which case their price might fall too low to encourage further investment into low-carbon technologies.

In a victory over some of her colleagues, Connie Hedegaard, the climate commissioner, has got the commission to agree to propose tightening up on emissions allowances in 2013-20. A political decision to approve this, which will involve haggling over where revenues from the trading scheme go, is probably not within reach until the Danes take the EU's rotating presidency in 2012. That offers a chance for Denmark to redeem itself, quips Abyd Karmali, head of carbon markets for Bank of America Merrill Lynch, referring to the dismal 2009 Copenhagen climate conference that Ms Hedegaard ran. The road map shows that some of that conference's ambitions still resonate in Brussels. But there is a big difference between drawing a map and following it.

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Estonian politics

# Calm after storms

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**Austerity can sometimes be popular. Just ask the Estonians**

ANDRUS ANSIP, Estonia's prime minister, is a happy man. After a strong showing in the election on March 6th he will keep the job he has had since 2005. So much for stereotypes of ex-communist countries' chaotic politics.

He also won despite a harsh austerity programme. The economy shrank by a seventh in 2009, pay fell by a quarter and nearly a fifth of the workforce became jobless. But rising exports are stoking a recovery. Growth in the fourth quarter of 2010 was over 6% at an annual rate (though unemployment is still 14%). In January Estonia joined the euro. Unlike most members, it meets its debt and deficit rules. So much for stereotypes of wobbly east European economies.

Mr Ansip's free-market Reform party wants more tax cuts. He believes that Estonia could become one of the five richest countries in Europe. Voters like both his ambition and his unpretentious style. Reform gained two seats, giving it 33 in the 101-strong parliament. Mr Ansip now has a choice of coalition partners. His previous partners, the conservative IRL, gained four seats, to get 23. But Mart Laar, its leader, is a former prime minister who fits badly into a government led by somebody else. So Mr Ansip may end up governing with the Social Democrats, who were the biggest election winners, jumping from ten to 19 seats. (The Green and agrarian parties fell out of parliament altogether.)

Whatever form the new government takes, it is unlikely to produce many surprises. Estonians of most political persuasions like their state lean and clean, with strong defence and close ties to America and their Nordic neighbours.

Bigger questions concern the opposition Centre Party, which lost three seats, going down to 26. Its support comes mainly from Estonia's ethnic Russian voters. The party leader, Edgar Savisaar, was at the centre of a row about clandestine party funding, involving the Russian railways minister and a donation to a Russian Orthodox church in a Tallinn suburb (he is the capital's mayor). Estonia's security service saw the payments as close to treason-a view echoed by other political leaders.

Mr Savisaar, who in 1990-92 piloted Estonia out of Soviet occupation, is no longer at the height of his powers. The Social Democrats are trying to woo his voters. That would create something that most ex-communist countries lack: a mainstream centre-left political party, untainted by suspicions about either its patriotism or its history. If this came about, Estonia's politics would not just be stable, but reassuringly boring.

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Charlemagne

# The divisiveness pact

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**Plans for closer economic integration in the euro zone could cause trouble**




"WHY are you trying to show divisions? Are we getting in your way? You are humiliating us." Such were the bitter words that Donald Tusk, the Polish prime minister, hurled at the leaders of Germany and France in February when they set out their "competitiveness pact", a plan for closer economic integration, complete with separate summits for the euro zone.

He had reason to worry, to judge by the humiliation in store at the meeting of European Union leaders in Brussels on March 11th. Over lunch at the Justus Lipsius building, the 27 EU heads of government were due to hold an emergency debate on north Africa. In the afternoon Mr Tusk, David Cameron of Britain, Fredrik Reinfeldt of Sweden and seven others were supposed to go home, leaving the 17 euro-zone leaders to discuss how best to salvage the single currency. Would the outsiders go quietly, satisfied by assurances that the competitiveness pact will be open to all-even if they were barred from the first night? Might some try to prolong the foreign-policy debate to sabotage the euro-zone summit? Indeed, might some just refuse to leave the room? One way or another, the sovereign-debt crisis is pushing euro-zone countries into deeper integration. Unless the process is handled with care, the day of separate summits may come to be seen as the moment when the euro zone uncoupled from the rest of the EU.

The surprise may perhaps be that this separation took so long. The deepest financial crisis in a century has exposed the fragility of a monetary union without a fiscal and economic union. Even now, the euro area as a whole has lower deficit and debt levels than America; in theory the fire in the bond markets could be doused by fiscal transfers and the mutualisation of debt. But Europe is not a state and any hint of a transfer union is anathema to Germany and others. In a union of sovereign states the most disciplined members do not want to pay for the most reckless. So the response has been limited, often too slow and sometimes contradictory. Resentment on all sides is surging and governments in both camps are being weakened, whether for granting bail-outs or for accepting austerity.

Euro-zone leaders have pursued two objectives: first, rescue those on the brink of collapse, such as Greece and Ireland, with temporary loans (not grants); and second, try to impose Germanic rigour to prevent future crises. None of this has convinced the markets. Moody's this week downgraded Greek debt, and yields on Portuguese bonds are dangerously high. Caught between a clamour to do more to help the euro and her taxpayers' refusal to give more, Angela Merkel, the German chancellor, is seeking a grand bargain: in exchange for boosting the euro's defences, she wants tighter economic co-ordination of the euro zone along German lines.

Hence her competitiveness pact. In its original draft, the Franco-German proposal set out six objectives to be achieved within a year, among them abolishing wage indexation, raising pension ages, creating a common base for corporate tax and adopting constitutional "debt brakes". All this was to be supervised by national governments, not the European

Commission, the EU's civil service. There would be yearly summits at 17 or 17-plus-the euro zone plus any others that choose to join.

After denunciation from all sides, the latest version, as revised by Jose Manuel Barroso, president of the commission (who is disliked by Mr Sarkozy and Mrs Merkel), and Herman Van Rompuy, president of the European Council (often seen as too close to France and Germany), is less abrasive and more coherent. Now renamed the "pact for the euro", it places the commission at its heart. It removes the overlap with existing plans for closer scrutiny of members' economic and budgetary policies. And it appoints the commission to supervise new commitments that are national prerogatives. It sets out broad areas of co-ordination-eg, keeping wages in line with productivity-but says the policy mix "remains the responsibility of each country".

**The wrong crisis?**

Yet it is still fair to ask if the pact is aiming at the right problems. One cause of market turmoil is fear of contagion because of the fragility of Europe's banks. But Germany is cagey about new stress tests and reluctant to recapitalise its institutions. This blocks any sensible debate about restructuring Greek and Irish debt in the near term even though, confusingly, Germany insists that bondholders must in future bear more of the burden.

If competitiveness is the aim, why not push for a more ambitious deepening of Europe's single market, particularly in services? It is also a strange competitiveness pact that excludes some of the most open and competitive European economies, among them Britain, Poland, Sweden, Denmark and the Czech Republic. Perhaps the aim was never competitiveness, but rather the political appeal of a pact. Solemn yearly pledges from leaders are easier to sell than the commission's bureaucratic process.

Yet to get this, Mrs Merkel has struck a Faustian bargain with France's Nicolas Sarkozy. He does not care for her economic medicine, but wants a euro-zone "economic government" to restore lost French influence (one senior Eurocrat remarks that France needs Germany to disguise its weakness, and Germany needs France to disguise its strength). But as the pact is made more palatable to others, it may get less appealing to Mrs Merkel. And that may make her even more reluctant to open her purse.

The danger is that the pact may make the crisis worse. In the short term, a less-than-grand bargain could trigger a new bout of market nerves. In the longer term the pact may lead not to competitiveness but to divisiveness. What to do? Mr Tusk and others might end up joining the pact, if only to preserve the single market-Europe's biggest competitive advantage.

Economist.com/blogs/charlemagne

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Public-sector pensions

# Tackling the intractable

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**A cleverly designed package of reforms will still arouse the unions' ire**



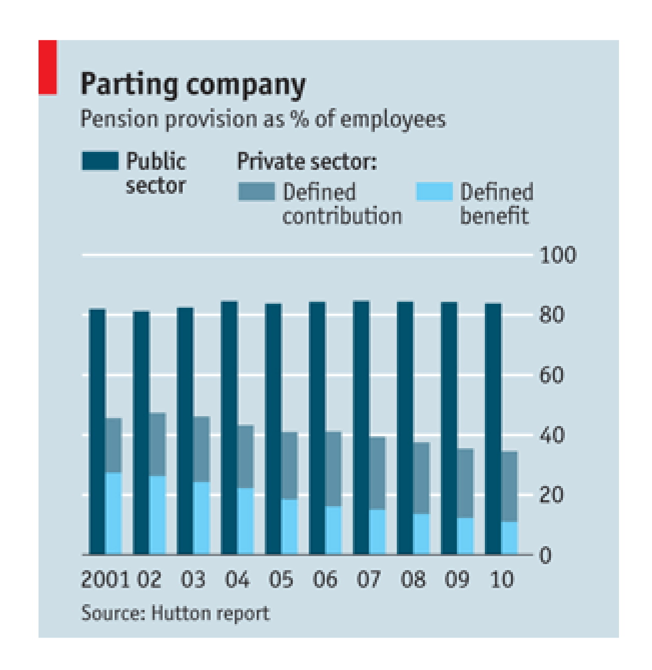

FROM Wisconsin to Greece, pensions are being trimmed as governments try to get to grips with unsustainable state spending. In America and Britain a particular target is public-sector pensions, and the exercise is painful. On March 10th teachers, nurses and millions more learned that they would have to work longer before getting their pensions, as well as pay more towards them. Rumours of massive strikes are already rumbling.

After the huge expansion of state and budget under Labour, it was inevitable that Britain's coalition government would ask public-sector workers to take some pain. The fiscal austerity plan set out by George Osborne, the Tory chancellor of the exchequer, last June entails a three-pronged attack on state employment costs, through a two-year pay freeze, job losses and pension reform. Of these, an overdue overhaul of overgenerous pensions has always had enormous potential for sparking a clash with the trade unions, whose power base is now in the public sector.

In a pre-emptive bid to head off trouble, Mr Osborne asked John Hutton, a former Labour secretary for work and pensions, to head an independent commission looking into the matter. Mr Osborne's move was shrewd. Lord Hutton, a politician of impeccable Blairite credentials, could not be attacked as a right-wing hatchet man. Instead he would look for reforms that were fair to both taxpayers and workers.

The case for the sweeping changes he recommended this week is manifest. The costs of public-sector pensions have been ballooning in recent years. The benefits paid out from the five largest schemes (local government, the National Health Service, teachers, the civil service, the armed forces and others all have their own plans) have risen by a third in real terms over the past decade. As most are not funded, it is the taxpayer who has been picking up the growing tab. The value of the unfunded pension liabilities was put by the government actuary's department at pound770 billion ($1.25 trillion) in 2008; some reckon it could be around pound1 trillion.

A particular concern is the widening disparity between public and private pensions. As private employers have woken up to the rising costs and big risks of providing final-salary schemes, based on years of service and end-of-career earnings, they have closed them first to new employees and increasingly to new accrual for existing staff. Pension provision through these defined-benefit (DB) schemes has been replaced by cheaper defined-contribution (DC) plans, in which workers build up their own retirement savings and bear the risk of disappointing investment returns, as well as the cost of living longer when they turn their pension pots into retirement income. By contrast, final-salary schemes remain alive and expensively kicking in the public sector.




That has caused a startling gap to open up in coverage. Only a third of private workers are now in an employer-sponsored scheme (and of these the majority are in inferior DC plans) compared with around 85% of the public-sector workforce, almost all of whom are in DB schemes (see chart). Even though public workers make up only a quarter of all employees (ie, excluding the self-employed), 5.4m are building up pension rights through DB plans, whereas only 2.4m private-sector workers are doing the same.

While private companies have responded to the soaring cost of pensions, the public sector has been laggardly. The normal pension age, typically 60 across the public sector, was pushed up to 65, the usual private-sector age, under Labour-but for new entrants. Contributions by workers stayed stuck at levels (6.5% of pay, on average) which meant more of the cost of provision fell on the taxpayer.

Lord Hutton had set out some short-term reforms in early October. He advocated raising employee contribution rates (except for the armed forces, who at present make none at all). Mr Osborne adopted that policy in his spending review later that month, resolving to raise rates by three percentage points on average by 2014-15, starting in April 2012. The specific changes were expected in his budget on March 23rd, but have been delayed until June.

This week saw proposals for fundamental long-term change. Lord Hutton has rejected the most far-reaching of all, to switch public employees from unfunded DB schemes to funded DC plans. One reason is that in the near term this would actually add to the budget deficit, as contributions were diverted from paying benefits to the new savings accounts. As important, such a change would provoke massive opposition from the trade unions.

But if the government is to continue to offer DB pensions, these must be radically reshaped to make them affordable in the longer term. Lord Hutton has grasped the nettle whose sting so terrified Labour. The retirement age, he says, must increase for existing employees, so that across the main schemes it will reach 65. Moreover, it must then be linked to the age at which public and private workers alike become eligible for state pensions. This is due to rise to 66 by 2020 (women's pensionable age is rising from 60 to 65 by 2018, and will then be the same as men's). Taxpayers will also be protected by "automatic stabilisers", such as higher contribution rates if costs break through a fixed ceiling.

These changes, especially the later retirement age, will infuriate public-sector workers already angered by cuts to public services, but their anger may be moderated by another proposal: letting them keep the benefits they have accrued by the time they make the transition. These would typically remain tied to the final salary at 60, and only future benefits would be affected by the higher retirement age.

In another radical reform, Lord Hutton also wants to replace final-salary schemes with "career average" plans. Pensions would be based on average pay throughout an employee's working life, rather than in the last lap. This change will annoy high-fliers especially, but will give those who plod at the bottom a better deal.

Conflict with the unions over these proposals is inevitable, though ministers are trying to get on to the front foot with other promises to simplify state pensions and tackle the means-testing that deters retirement saving. But Lord Hutton has at least handed the government a cleverly designed package that may make opposition less bitter than it would have been.

The reforms will be painful but, as Lord Hutton points out, the higher pension age will in a sense just return the schemes to the 1980s, when public-sector pensioners could expect to spend a third of their adult lives in retirement rather than 40-45% as is now the case. He has given the government a fighting chance of sorting out a problem that has been allowed to fester for too long.

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Heathrow revisited

# The mayor's new air war

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**London's airports are too full, but will a plan to remedy the problem take off?**

A NEW round of air wars looms, and more than London's transport links is in the firing line. Boris Johnson, the mayor, has written to the chancellor of the exchequer, George Osborne, asking him to consider examining "the case for the delivery of a new aviation infrastructure [and] ...increased aviation capacity" to serve the capital. Carefully timed before the budget on March 23rd, Mr Johnson's ploy could reopen a long and bitter argument over what sort of airport capacity London needs and where to provide it.

With only two full-length runways and over 66m passengers a year using them, Heathrow airport is at bursting point. It is also hemmed in by homes, making any expansion unpopular. The Labour government's plan for a third runway there was defeated in 2008 after opposition from Conservatives, Liberal Democrats, environmentalists and people living under the proposed flight path.

Mr Johnson's contribution to the debate was to propose a brand new airport on an artificial island in the Thames estuary, purpose-built and capable of operating around the clock. "Boris Island" was dismissed by the Tory leadership as an expensive flight of fancy: too far from London to attract business travellers without costly new transport links.

But the Mayor is not the type to give up easily. At the start of this year, he produced a study calling for either a four-runway hub airport on a new site in the estuary or increased capacity at existing airports nearby, such as Gatwick or Stansted. Mr Johnson is a Tory-but his proposals are explicitly opposed to his party's repeated assurances that no expansion of London's main airports is planned.

The mayor argues that Heathrow is falling behind continental airports. It serves just 185 destinations, compared with over 200 from Paris's Charles de Gaulle and 300 from Frankfurt. A business-friendly capital, he says, needs to make flying in and out more attractive. That means more capacity.

Mr Johnson has a point, but his campaign is one part aviation and one part raw politics. He is thought to harbour leadership ambitions, and if so must have his eye on a fight one day with Mr Osborne, currently his most likely rival. The

green Conservatism espoused by David Cameron has no deep roots in the party; Mr Johnson's case for putting business first will resonate with many. Mr Osborne, for his part, is under pressure as chancellor to show that he has a recipe for restoring growth (see Economics Focus). The mayor has been at pains to carve out a distinctive position on London and its interests, pointing out an "aviation-shaped hole" in government plans to boost the capital as an enterprise centre.

City Hall isn't remotely in a position to impose a new Boris Hub on the south-east, but talking about it can create trouble for Mr Johnson's rival on the political runway. No doubt that has occurred to him.

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Police pay

## Not a happy lot

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**Revamping police pay and perks is justified but could nonetheless end badly**

IT WAS a double whammy for the police this week. Like other public-sector workers, they got the bad news on March 10th that pensions were becoming less generous (see article). But they were also raked over the financial coals on March 8th when Tom Winsor, a former rail regulator asked by the government to look into police pay and conditions, recommended rejigging allowances, bonuses and overtime. This, his review said, could reduce some officers' pay by as much as pound3,000 a year while raising that of those who work unsocial hours on the front line, or have special skills; the exchequer overall would save some pound217m ($350m) a year from 2013-14. The home secretary, Theresa May, is likely to take most of the ideas forward. Rank-and-file coppers are up in arms.

The police are seen by many pundits as the last unreformed public service. Pay reviews in 1962 and 1978 recommended massive (and merited) increases. Constables now make between pound23,000 and pound37,000 a year, more than many in the public sector. And extras have become embedded in the structure. Officers who work bank holidays without eight days notice get double pay plus a day off in lieu. Wages include a 9% element for working unsocial hours, though less than 60 of policemen actually work them. A competency allowance to reward exceptional skills and performance is won by 98% of those who apply for it.

But police don't see things quite that way. Their job is often dangerous. They are not allowed to strike. Their budget is being cut by 20% over four years, much more than most other public services. Predictions are that 28,000 jobs will be scrapped, including 16,000 police officers (almost an eighth of their current strength). And, like other public-sector workers, the police already face a two-year pay freeze from September.

What is really at issue, beyond tussles over pay and "Spanish practices" at a time of fiscal austerity, is that policing has changed since the days when it was carried out mainly by men without degrees doing much the same thing as their fellows and in predictable shifts. It has become a more specialised business, requiring greater flexibility of work patterns and differentiation of skills. Pay is just one of the rigidities in the system that make it hard to manage a police force in modern times. Mr Winsor will be making further recommendations about all this in June.

Before then, the government has some uneasy moments to get through, beginning with a big march on March 26th against cuts in public services. It needs its police. Margaret Thatcher, prime minister through the conflict-ridden 1980s, was careful to have the cops on board when she confronted unhappy workers. This time, says Paul McKeever, chairman of the Police Federation, "Those policing the march will be facing deeper cuts than those actually on it."

Foreign policy

# Rookies abroad

**The government's foreign missteps are multiplying**



Hague takes on the world, and fumbles

CARRYING grand plans to shrink and reshape the British state with him into Downing Street last May, David Cameron was hoping for few foreign distractions. To that end, the prime minister gave wide latitude to his foreign secretary, William Hague, a man with the clout of a former Conservative leader and one of only two current cabinet members to have run a department of state before. But the upheaval in the Middle East has brought international affairs to Mr Cameron's door regardless. And Mr Hague is having a tougher time than many had expected.

On March 7th he confirmed that he had authorised a botched mission to make contact with opponents of Colonel Muammar Qaddafi, Libya's leader. Three days earlier, a small team of Britons, thought to include a diplomat, an intelligence official and members of the Special Air Service (SAS), arrived in Benghazi, a rebel stronghold in eastern Libya. Their goal was to forge links with the rebels but their arrival, apparently unannounced and under cover of darkness, alarmed the Libyans, who took them hostage. They were released on March 6th.

Tragedy was averted, but farce can be just as damaging politically. Mr Hague accepted full ministerial responsibility for the failed mission. But it was only the latest in a series of missteps by the government as it tries to come to grips with events in the Middle East. Mr Cameron has been hasty in talking up the idea of a no-fly zone over Libya, and the mission to evacuate Britons from the country has also been executed sloppily. The Labour opposition, which increasingly believes the government is more vulnerable to the charge of incompetence (in both domestic and foreign policy) than to moralistic lines of attack, accuses ministers of "serial bungling".

As the SAS fiasco entered the public domain, another crisis emerged for Mr Hague. On March 6th he was forced to defend Prince Andrew, who serves as Britain's special representative for international trade and investment, after the prince's links with Jeffrey Epstein, an American businessman and convicted sex offender, hit the headlines.

Mr Hague was hardly to blame for poor judgment on the prince's part. But the controversy is still a setback for his foreign policy. Central to his vision for British diplomacy is the promotion of national economic interests abroad. He and many Tories think countries such as France and Germany do this more effectively. Among his first acts in office was to instruct ambassadors to focus on drumming up business for Britain. That remains a worthwhile policy and Mr Cameron reiterated his commitment to it on March 6th. But it has been made to look unseemly twice in recent weeks: before Prince Andrew's troubles came Mr Cameron's own commercial tour of the Arab world just as the region's regimes were being shaken by protesters.

Responding on March 8th to doubts about his commitment to his job, Mr Hague said only that he had a duty to bear its burdens "for an extended period of time". Some question whether his appetite for politics, which in his youth bordered on monomania, ever returned after he led the Tories to a landslide loss in 2001. Having fought that election on a right-wing platform, defeat left him wary of Tory orthodoxy, so former allies on the party's right now view him with suspicion.

But Mr Cameron has been complicit in the recent mistakes: he was aware that a diplomatic team would be sent into eastern Libya, and sources in Downing Street cast doubt on Prince Andrew's position before hurriedly shoring it up. Mr Cameron has also failed to settle the Conservatives' ideological split over foreign policy. In opposition, the likes of George Osborne and Michael Gove, now the chancellor of the exchequer and the education secretary respectively, were keener to promote democracy abroad than Mr Hague and others who were more concerned with stability. Either of these two visions could have shaped a clear and consistent response to the tumult in the Middle East. A hybrid of the two-though a genuine reflection of Mr Cameron's own views-has failed to.

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Higher education

## Reassuringly expensive

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**Getting poor students to university costs more than money**



The cleverest clogs from everywhere

WHEN Parliament voted almost to treble to pound9,000 the maximum annual tuition fee that can be charged students at English universities from September 2012, coalition ministers had three aims. The first was to help fill the alarming hole in the nation's finances by slashing the sums spent on higher education; it was embraced most strongly by the Conservatives. The second was to create a market in university education, again popular with the right. The third, championed by the Liberal Democrats, was to get more students from poor families into university, despite the initially daunting higher fees. It is the final aim that now looks most likely to be realised.

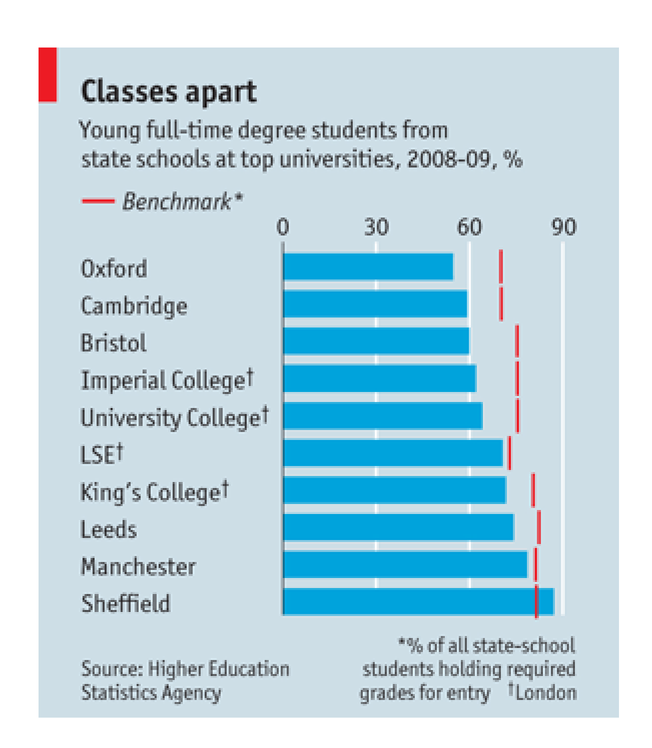
As the government also plans to cut the money it provides universities to teach students, some 130 English institutions of higher education intend to increase their tuition fees; their governing bodies have until April 19th to say by how much. Three universities-Cambridge, Imperial College London and Exeter-have already announced that they will charge top whack, and Oxford hints that it will have to do the same if it is to fund bursaries for students from poor families. When the maximum fee was last raised, in 2006, almost all universities soon charged the top rate. Raising the cap again, and by so much, was supposed to let them set differential fees that reflected the quality of the education they provided, as well as encouraging potential students to assess whether they offered value for money. Instead it appears that prices will cluster at the upper extreme.

Part of the problem is perception: price is seen as a proxy for quality. Universities do not want to seem cheap because students might suspect that a low tuition fee signals a second-rate product. But higher education is also genuinely expensive. The average cost of teaching an undergraduate is pound7,500. Some universities want to offer their students a better education than they do now, and must charge more to cover the cost of delivering it. Others anticipate the loss of specific income streams-from, for example, government plans to shift teacher training into schools.

And more costs attached to raising the attainment and aspiration of schoolchildren will now fall to universities. On March 8th the Office for Fair Access, a quango established to cajole universities into accepting students from poor families, said that any of them charging more than pound6,000 a year would have to spend some of the surplus on improving access. That will push fees higher too.

This eliminates price as a market force in high education and also adds to the state's bill, for government pays the fees until a student graduates and earns an annual salary above pound21,000. To limit the damage, David Willetts, the universities minister, has threatened vice-chancellors with further funding cuts should the average tuition fee turn out higher than pound7,500. This is the sum the government assumed in devising a system of financial support for students it thought it could afford.

But Mr Willetts lacks the means to implement his threat in a way that would target the institutions he thinks are raising their fees too much. From September 2012 the state will give teaching grants only for science, technology, engineering and medicine: all subjects that the government wants to encourage. Mr Willetts could reduce university research grants, but that too would fail to curb mediocre institutions' tuition-fee ambitions, for research is concentrated in the elite ones. And it will be years before new providers of higher education, which he plans to encourage, exert discipline on the old-timers.




The Lib Dems, meanwhile, can pull levers to ensure the outcome they are keenest on because the Office for Fair Access can fine institutions that fail to attract students from poor families. The latest global ranking of universities published on March 10th by *Times Higher Education*, a magazine, puts 11 English universities in the top 100 (Edinburgh University also features). All but one of those-Sheffield-have a smaller proportion of state-school full-time undergraduates than might be expected, given the number of state-school students across the country who meet their exam-grade entry criteria (see chart).

One big reason is that even clever state-school students (not all of whom, of course, are poor) often do not apply to top universities, as a study by the Sutton Trust, a charity, has found. So the Office of Fair Access wants universities to seek them out more diligently. Those that charge more than pound6,000 a year will have to set-and meet-formal targets for enrolling more poor students, on pain of losing the right to charge those fees. Interestingly, the quango thinks universities would do better to spend less on bursaries for poor students and more on outreach to raise their ambition and achievement.

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Capita and the deficit

# Austerity's winner

**Outsourcing firms reckon on fixing Britain's public finances**




SQUEEZING a decent profit from a slow year is a pleasing knack for any company. For a firm such as Capita, which sells cost-cutting fixes to others, including government, it is also good advertising. Last month the outsourcing group, Britain's biggest by market capitalisation, announced a solid 10% increase in underlying profits for 2010, which rose to pound395m, on a meagre 2% rise in revenues. Profit margins widened from 13.3% to 14.4%, thanks to smarter use of information technology and office space, and keener terms from suppliers.

Conditions last year were difficult. Half of Capita's business is with the public sector: it stores criminal records and runs the TV licensing bureau, for instance. The general election and change of administration last May held up the tender of government work. Private-sector deals were slow, too. In total, the group won or retained big contracts worth pound795m, down from pound1 billion in 2009. But this year looks much brighter. Capita is close to getting the same level of orders in the first nine weeks of 2011 as it did in all of 2010, says Paul Pindar, its boss.

Some of this year's new business looks likely to come from abroad. But Capita also hopes to be one of the few winners from Britain's looming fiscal austerity. The government is keen to outsource more tasks to private firms, both to save money and to reduce the state's role in providing public services. Capita stands to gain, though it risks getting more work but making less on each job. Last summer Francis Maude, the cabinet-office minister, hauled in 19 outsourcing firms, including Capita, to press for better terms. A 14.4% profit margin might be fine for a branded-goods firm but looks indecent for a business that caters to cash-strapped government. Mr Pindar says its healthy profits are rewards for risk and effort, as well as for living in modest offices with a lean management team.

Firms such as Capita (or Serco or G4S, other big outsourcing companies) hold the key to fixing the public finances, many think. "We can typically find 30-40% cost savings in two years for a service with higher standards," Mr Pindar says. He bursts with money-saving ideas. Capita could do the back-office work of the police service with half the staff, he reckons. Hundreds of millions of pounds could be saved if government departments arranged their travel centrally. Health trusts could find extra money for patient care if they shared resources, such as finance, personnel and IT. Nor, he believes, is it necessary for contracts to be overly complex, a common fault with private-finance initiative deals, many of which have turned out to be costly for the taxpayer. "It's quite easy," says Mr Pindar: "Measure outputs, not inputs, and target ten, not 70, things you really care about."

The sort of back-office work that Capita specialises in is unglamorous. Managers often prefer to focus on new products rather than the duller work of business process. Outsourcing specialists can help strip out redundant tasks, add a dollop of IT and spark workers with better incentives. The government is counting on this kind of alchemy to transform its fiscal fortunes.

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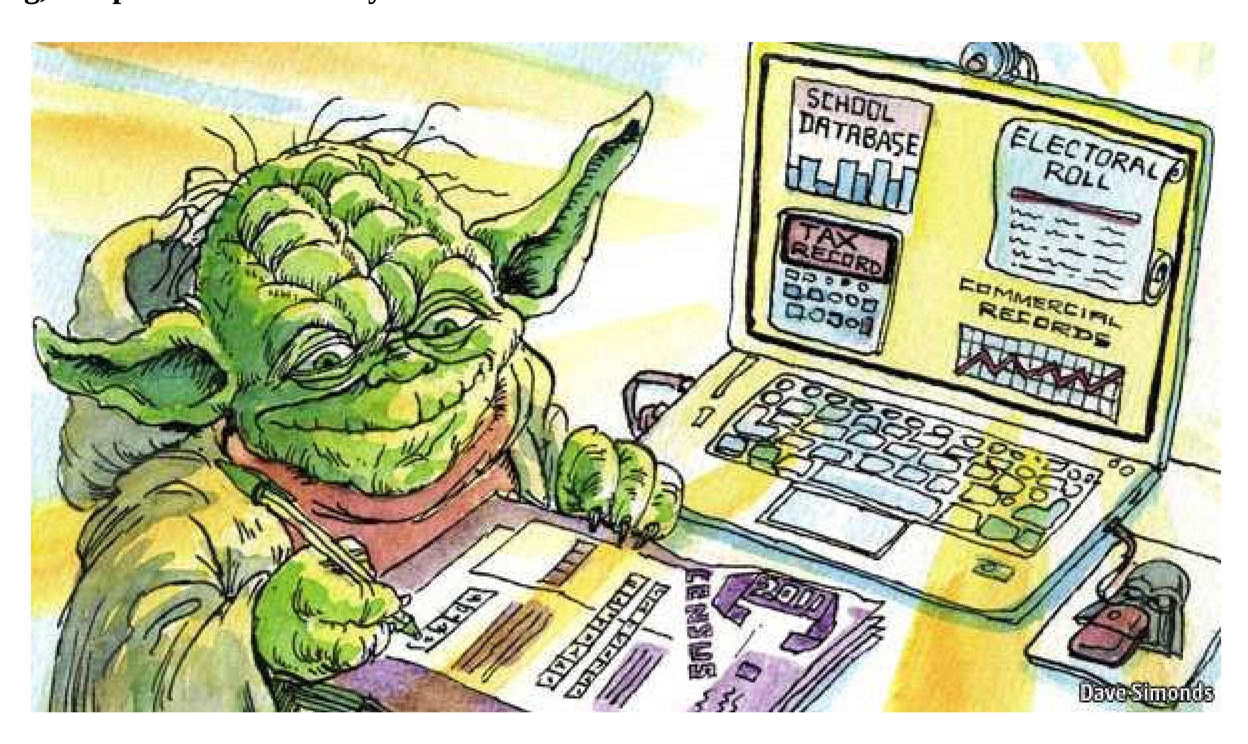
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The new census

# The final count

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**This year's big, complicated census may also be the last**




A BASIC question facing any government is just how many people it is in charge of. Every tenth year since 1801 (with the exception of wartime 1941), the British state has set out to count its residents. The forms for the 2011 census began thudding onto the nation's doormats on March 8th. Yet a combination of rising costs, increasing complexity and decreasing relevance mean that this year's count may be the last.

The first censuses did little more than tick off the number of people living in a particular house. As the state's responsibilities have expanded, however, so has its appetite for data, and each new census form is bulkier than the last.

Choosing which questions to ask is a delicate business. In theory, the better informed a government is, the better it can do its job. Census answers inform almost every aspect of government policy, from projecting population growth and writing budgets to planning road extensions and new towns.

But the government's statisticians are acutely aware that people may not respond to questions that are seen as too intrusive-or may deliberately falsify their answers. An estimated 3m people failed to complete the 2001 census. Hundreds of thousands of others sabotaged a voluntary question about religion by claiming that they were Jedi, the bathrobe-

wearing superheroes of the *Star Wars* films. This time around, a question asking immigrants how long they intend to remain has been criticised for sounding unwelcoming. In theory, falsifying information or ignoring the form carries a pound1,000 fine, but in practice almost no one has to pay it.

There are other problems with the decennial count. Britain is an increasingly footloose place, which means that census data goes stale faster than ever. Local councils, whose budgets are based partly on census data, have long complained that a decade of high immigration has stretched services mercilessly as newcomers move in without extra funding for them from Whitehall.

That mix of public wariness and the decreasing lifespan of the information could spell doom for the traditional headcount. The rise of big, computerised databases means that it is possible to have a continuously-running "virtual census", automatically sucking information from things like school enrolment, the electoral roll, tax records and perhaps even commercial transactions, all buttressed by limited, specific polling.

Not everyone welcomes the idea. Genealogists mourn the passing of a favourite source of data. Privacy advocates say that the decennial theatre of a census is a useful way to help define exactly how much the state has a right to know about its citizens.

But three powerful advantages commend the new approach (which was pioneered in Scandinavia) to governments. One is cost: the 2011 census is expected to cost around pound480m, whereas a virtual census could be conducted for far less. A continuously running count will be more up to date than a once-a-decade snapshot. And a more subtle approach to information-gathering may irritate people less-and therefore yield more accurate data.

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Bagehot

## Europe: it's back

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**David Cameron's strategy for avoiding EU trouble falls foul of events**




BRITAIN is not about to walk out of the European Union. Opponents of EU integration may dream, but-in the near or medium term-no British government will risk a withdrawal in cold blood, in hopes of securing cut-price associate membership.

Yet there is a non-trivial chance that Britain might fall out of the EU one day. Such a falling-out would involve a hasty withdrawal from a Europe that had taken an impossibly unpalatable turn. The chances of such a messy crisis are rising. Should Britain end up out of the union, some years hence, historians may look back at two events of the present: a European Union bill currently before Parliament, and Brussels summits planned for March 11th.

Britain's new European bill requires a referendum on any new treaty that would transfer powers from Britain to the EU. Ministers have given themselves some wriggle room-governments always do-but not that much. Because almost any European referendum would be lost in Britain (apart, perhaps, from an in-or-out vote), the effect is to bolt Britain firmly to the union's legal status quo. Yet at the same time, thanks to the existential crisis facing the single currency, Europe's tectonic plates are in motion.

Ask David Cameron how sustainable his strategy feels. His timetable for March 11th goes like this: a morning summit for all 27 EU leaders, enduring the worst sort of footling Brussels misery: a windy address from the boss of the European Parliament, a "family photo" with colleagues, then a working lunch to debate the tumult in north Africa (expect unimportant conclusions about this important subject). After press conferences, Britain's prime minister will head for home, leaving his 17 euro-zone colleagues to hold a serious, substantive discussion about economic co-ordination within a "pact for the euro" (see Charlemagne).

In 2008, when a first summit reserved for euro-zone leaders was called by the French president, Nicolas Sarkozy, it was termed an emergency and Britain's then prime minister, Gordon Brown, was allowed to attend, exceptionally. To soothe the uninvited, a second and third were presented as ad-hoc responses to market turmoil. This being the fourth euro-zone summit, however, it is starting to look like a habit. That is a victory for the French, and a concession by Germany. France has long wanted more decisions taken by the euro zone, which is smaller and excludes some loud voices for free-market liberalism, such as Britain and several Nordic and ex-communist countries. For the same reasons Germany (which likes to cast a deciding vote between free-market and statist arguments) wanted Britain in the room. But shortly after he came to power, Mr Cameron told Germany's chancellor, Angela Merkel, that Britain would stand aloof from deeper integration aimed at shoring up the euro. That was at once a perfectly rational reading of British domestic politics, and a decision that pushed Germany into the arms of the French.

None of this is to say that Britain is poised for a swift exit. Whitehall sources argue that Mr Cameron has already secured a written vow by the 27 leaders that euro-zone deals may not undermine an achievement dear to Tory hearts-the EU's internal market, with its free movement for capital, goods, people and services (at least in theory). Future euro-zone summits may not happen very often, they add hopefully. What is more, British opt-outs from the euro or the Schengen agreement (which abolished border controls) have successfully eased strains between Britain and its neighbours. There are free-trade advocates, such as the Dutch, inside the euro zone who still want Britain's voice to be heard. Finally, Britain will step up bilateral diplomacy around Europe: Mrs Merkel and Mr Cameron get on famously, sources confide.

**Now for the bad news**

All true, no doubt. Yet the same people admit to intense debate within government about less rosy scenarios. In a private Brussels meeting this month, Nick Clegg, the deputy prime minister and Liberal Democrat leader, quizzed Herman Van Rompuy, the president of the European Council, about the danger that a "two-tier Europe" was being created, with Britain in the lower tier.

It is not just Lib Dems who worry. It is "foolish to deny" that euro-zone meetings could turn into a caucus for big decisions, admits a senior Tory. If the worst comes to pass, the 27-strong EU risks being "little more than a rubber stamp", says an official. If Britain had put its mind to it, he suggests, Mr Cameron could have demanded a seat at the table without joining euro-zone bail-outs, or even signing up to euro-zone disciplines. Meanwhile, other governments are intent on gaining access to euro-zone summits. Britain risks looking "very peripheral".

Bring it on, would be the response of many Conservatives. Such bolshiness is a final reason to think that Britain's relations with Europe have entered uncharted territory. The EU is evolving unpredictably. Beyond the euro crisis, the Lisbon treaty has given new powers to the European Parliament, a maddening assembly addicted to regulation and public spending. The European Court of Justice is ever more activist, handing down rulings that enrage British public opinion. At the very same time, today's parliamentary Conservative Party is the most sceptical ever. The 2010 intake, in particular, "just find Europe nauseating", says an MP, himself deeply Eurosceptic. Most newspapers are implacably hostile. To appease such forces while avoiding rifts inside the coalition, Mr Cameron's government has ended up in a defensive crouch. Fatally, European decisions end up being judged against the sole yardstick of sovereignty, rather than that of Britain's interests.

Ministers are worried and should be. Tory MPs, the press and voters already imagine Britain to be powerless in the face of EU diktats. Now Britain risks a real loss of influence-and the government is unwilling to do very much about it. How, plausibly, does this end well?

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Reputation management

# Glitzkrieg

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**Respectability is for sale. Here is a buyer's guide. Names are omitted to protect the guilty from blushes and us from lawsuits**




PICTURE yourself as a big shot from an unpopular country-leader of an oil-rich bit of the Middle East, say, or a tycoon from a grungy bit of the former Communist world. You wish your family could shop, invest, socialise and study in the richest and nicest parts of the world (and flee there if needs be). But you don't deserve it and won't earn it: you will not stop torture, allow criticism, obey the law, or keep your fingers out of the public purse.

Luckily, respectability is on sale. You just have to know how to buy it. The place to start is London. Among its advantages are strict libel laws, which mean nosy journalists risk long, costly legal battles. And helpful banks, law firms, accountants and public relations people abound.

Laws on money-laundering have irritating requirements about scrutiny of new customers. This used to be merely an exercise in ticking boxes, but has got a bit tougher. Still, a well-connected and unscrupulous banker will be your best friend, for a fee. You cut him in on some lucrative transactions with your country or company. In return he will pilot you through the first stages, arming you with a lawyer (to scare rivals and critics) and an accountant (to keep your books opaque but legal).

Next comes a virtuous circle of socialising and do-gooding. Start with the cash-strapped upper reaches of the cultural world: a big art gallery, an opera house, or something to do with young musicians. Donations there will get you known and liked. Or try funding a prize at UNESCO or some other international do-gooding outfit. Support causes involving war veterans or sick children. Sponsoring sport works too. But don't overdo it-the public is wiser than the glitterati, and will soon scent a crude attempt to buy popularity.

Send your children to posh English schools. Shower hospitality on their friends: they will be important one day. But invite the parents too: they are influential now. A discreet payment will tempt hard-up celebrities to come to your parties. Minor royals are an even bigger draw: British for choice, but continental will do. Even sensible people go weak at the knees at the thought of meeting a princeling, however charmless or dim-witted.

Many such titled folk like a lavish lifestyle but cannot earn or afford it. So offer a deal: you pay for their helicopters, hookers and hangers-on. In return, they bring you into their social circuit, and shower stardust on yours. You will need patience: the parties are dull and the guests vapid and greedy. Building your reputation as a charming and generous host may take a couple of years. But once people have met you socially they will find it hard to see you as a murderous monster or thieving thug. Useful props in this game are yachts, private jets, racehorses, ski chalets and mansions.

Armed with social and cultural clout, you can approach money-hungry academia and think-tanks. A good combination is a Washington, DC, think-tank and a London-based university (Oxford and Cambridge, being richer, are also choosier about whom they take money from). The package deal should involve a centre (perhaps with a professorial chair) and a suitable title: it should include words like global, sustainable, strategic and ethical.

**I stink, you think**

On the subject of titles, expect an honorary doctorate for yourself and a PhD for your favourite young relative. This need not be an onerous undertaking. A lobbying firm can help with the research. Think-tanks' flimsier finances make them easy prey too-and they are more immediately influential than universities. Most of their experts are expected to raise all their own funds. A few million here or there is chicken feed for you but a career-saver for them and their programmes.

Sponsorship does not just make you look brainy and public spirited. It also skews the academic debate. If you are a pious Muslim, let it be known that a focus on uncontroversial subjects such as Islamic architecture, calligraphy and poetry will keep the money coming. Textual criticism of the mutually contradictory early versions of the Koran, by contrast, is a no-no. If you are from Russia, support cheerleaders for the "reset" in relations with America and pay for people to decry former Soviet satellites as irrelevant basket cases. If you are in oil or gas, pay for studies criticising the disruptive exercise of competition law on energy suppliers.

Then move on to the media. Generous advertising in the mainstream print dailies is a good way to make friends. Nobody will read the lavish supplements that trumpet your imaginary virtues and conceal your real flaws. But the newspaper's managers will be happy. It may be too much to expect them to get the journalists to tweak their coverage (though that can happen) but you will find it easier to put your point across. Sumptuous fact-finding trips are an easy way of making hacks' heads softer and hearts warmer. You can also hold conferences, with high fees for journalists who moderate sessions or sit on the panels. They will soon get the idea.

You are now in a position to approach politics. Most rich countries make it hard (or illegal) for foreigners to give money to politicians or parties. But you can oil the wheels. A non-executive directorship can be a mind-changing experience. Invite retired politicians and officials for lucrative speaking engagements and consultancy work: word will soon get around and the soon-to-retire will bear your interests in mind. Even better, set up an advisory council stuffed with influential foreigners. You need tell them nothing about what you do. Nor do you have to heed their advice.

Foreign respectability also makes you look good in the eyes of your own people. And it demoralises your critics, crushing their belief that Western media, politics, academia and public life are to be admired.

Your progress from villain to hero will not always go smoothly, especially if you have to start killing your opponents. But when the alarm is raised, your allies will rally to your defence. A tame academic can write an opinion piece; a newspaper grateful for your advertising will publish it. Your fans can always say that someone else is much worse and that you are at least a reforming, if not fully reformed, character. A few references to American robber-barons such as John Pierpont Morgan will bolster the case. So too will a gibe at less-than-perfect Western leaders such as Silvio Berlusconi. After all, nobody likes hypocrisy.

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How to start a nation

# Trappings of state

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**Getting a brand new country off the ground is a fiddly business**




SOUTH SUDAN chose its new national anthem in democratic style. In a packed concert hall in Juba, the young state's scruffy capital, rival choirs performed their entries. Purists argued that the winner's tune did not fit its lyrics. But the decision has laid down one stone on the road to statehood. Less fun lies ahead. Hooking up with the international system's buried wiring involves gaining everything from telephone dialling codes to internet suffixes, via postal connections, air-traffic control and trade tariffs.

A foreign service is already taking shape. Around 100 southerners worked as Sudanese diplomats; diaspora members already man outposts in many countries. More staff are needed. Outsiders are hurrying to help. Independent Diplomat, a charity, is advising the new state. Austria is offering five places at the world's oldest diplomatic school in Vienna.

Their first task is formal but vital: to gain diplomatic recognition. Notching up all 190-odd countries will take time-Estonia, which regained independence in 1991, has relations with only 170, most recently formalising ties with Haiti in 2010. But recognition from the world's main governments (and the likely lack of any opposing voices) enables a vital step: membership of the United Nations.

South Sudan will tread a path already navigated in recent years by East Timor, Eritrea, Slovakia, and the ex-Yugoslav and ex-Soviet republics that had big-country blessings on their birth. The process is hardly glamorous: new countries do not get an embossed birth certificate or a fanfare. Instead, the Editorial, Terminology and Reference Service of the United Nations Documentation Division will enter the state in "Country Names"-a pamphlet that lists in six languages the popular and formal names of full UN member nations. Outsiders such as Abkhazia, Kosovo, Northern Cyprus and Western Sahara have to make do with a place on lesser lists, such as those compiled for less political purposes by the UN Statistics Division.

The listing in New York sets many wheels turning. It grants a spot in ISO 3166-1, a directory compiled by the Geneva-based International Standards Organisation. This list converts national names into two- and three-letter codes (AFG for Afghanistan; ZWE for Zimbabwe). These codes will help sort the new state's international post, mark out its citizens in immigration databases and allow the South Sudan pound to feature on international exchanges when it launches in July. The national top-level domains used in web addresses (like ".fr" for France and ".de" for Germany) are usually the same as the ISO two-letter codes. South Sudan's web sites may have the sinister if logical ".ss" suffix.

International telephone codes are allocated by the International Telecommunication Union (ITU), a UN agency also based in Geneva. It will grant the South Sudanese a dialling code, replacing Sudan's +249. (Eritrea, until now Africa's newest

country, is +291, so +292 could be for South Sudan.) The ITU also divvies up radio wavelengths. A South Sudanese space-satellite programme may still be some way off, but the new country will have a place in the weighty Master International Frequency Register.

Before South Sudan's new diplomats relax on the cocktail circuit, they will also need to establish ties with a long list of other outfits. The International Civil Aviation Organisation deals not just with air travel, but will also help the new government issue machine-readable passports. The Universal Postal Union will allow the country's new postage stamps (eagerly awaited by philatelists) to convey letters abroad.

That is a big hurdle for would-be countries outside the fold: Somaliland's mail often comes via Ethiopia; Palestine's post until recently had to go through Israel; until 2008 post between Taiwan and mainland China went via Hong Kong or Macau. South Sudan has no coastline, but it may well join the International Maritime Organisation, much preoccupied these days with piracy in nearby waters. Around half the world's landlocked states belong to the body.

Textbooks, encyclopedias and wall maps may take time to catch up with the new country. Some cash-strapped libraries still use atlases showing fossils such as the Soviet Union and the German Democratic Republic. But after decades of struggling for independence, South Sudan is not short of patience.

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# Correction: Food, Libya and the UN

Our special report on the future of food (February 26th) said an African Development Bank programme aimed to cut waste by 3% a year over seven years. That should have been 3% over seven years. A Cornell University project aims to cut the cost of genetic identification to $30 per million DNA markers, not per million genes. And *Bacillus thuringiensis* makes maize resistant to some pests, not to herbicides.

Our report on Libya and the UN (March 5th) misspelled the name of Eileen Donahoe, America's ambassador to the Human Rights Council. Sorry. This has been changed online

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Monitor

# Rocks on the menu

**Biotechnology: High commodity prices have encouraged the use of mineral-munching bugs to extract metals from waste or low-grade ore**




EVEN the sleekest gadget depends on the mucky business of digging stuff out of the ground. Mobile phones and computers use copper for their wiring and rely on cobalt, germanium, lithium, nickel, platinum and tantalum for other components. Electric motors need magnets made of "rare earth" elements such as neodymium. But rising metal prices and China's tightening grip on supplies of rare-earth elements (it accounts for 97% of production), have heightened the appeal of finding other sources of supply. The result is growing interest in the use of rock-eating bacteria to extract metals from low-grade ores, mining waste or industrial effluent.

Rock-eating bacteria such as *Acidithiobacillus* and *Leptospirillum* are naturally occurring organisms that thrive in nasty, acidic environments. They obtain energy from chemical reactions with sulphides, and can thus accelerate the breakdown of minerals. Base metals such as iron, copper, zinc and cobalt occur widely as sulphides, and more valuable metals such as gold and uranium are also present in the same bodies of ore. With a little help from the mineral-munchers, these metals can be released in a process called bioleaching.

This approach has its pros and cons. To recover large quantities of metals quickly from ores with a high metal content, smelting remains the most profitable route. Bioleaching is slower, but it is also cheaper, making it well-suited for treating ores and mining wastes with low metal concentrations. It is also generally cleaner. Material containing poisonous elements such as arsenic is unsuitable for smelting because of the risk of pollution.

For many years bioleaching has been used to recover gold from ores that are hard to break down using heat treatment (known as "roasting"). The bacteria are set to work in huge stirred tanks, called bioreactors, containing ground-up rocks and dilute sulphuric acid. The bacteria change one form of iron found within the ore (ferrous iron) to another (ferric iron) and tap the energy released. In acidic solutions ferric iron is a powerful oxidising agent. It breaks down sulphide minerals and releases any associated metals.

In the past it has been hard to recover metals other than gold profitably in this way. But high commodity prices mean that bioleaching of a variety of metals has become an attractive prospect in recent years. In 2008, for example, a new venture started operating in Talvivaara, Finland. It was set up as the result of a European research project called BioShale, which showed that bacteria could recover nickel, copper, lead, silver, zinc, cobalt, rhenium, selenium, tin, gold, platinum, palladium and uranium from Europe's extensive but underexploited "black shale" deposits. Last year the Talvivaara Mining Company produced over 10,000 tonnes of nickel and 25,000 tonnes of zinc from local shales, and it plans to deliver 90,000 tonnes of zinc, 1,800 tonnes of cobalt and 15,000 tonnes of copper a year by 2012. In 2010 the firm started to extract uranium, and expects to produce 350 tonnes a year. Other metals may follow.

In Chile, which has 30% of the world's copper deposits, BHP Billiton, a mining giant, has set up two bioleaching operations in the past three years, each aiming for around 200,000 tonnes of copper production a year. The Finnish and Chilean ventures both use bioheaps, which are vast, carefully engineered piles of ground-up ore (in Chile, 2,000 metres long, over 100 metres wide and nearly 20 metres high), irrigated from above with dilute sulphuric acid laced with bacterial cultures, and aerated from below. Using many different organisms within the heaps gives the best results, says Barrie Johnson, a researcher at the University of Bangor in North Wales, who has been working on bioleaching with Rio Tinto, another mining giant. "We find one ore type will suit one consortium of organisms, and another might be better with a different mixture," he says.

Meanwhile a Canadian firm, BacTech Mining Corporation, which sells a bioleaching process for gold extraction, has set up a new division to apply the technology to mining waste. At the town of Cobalt in Canada it plans to remove toxic elements such as arsenic from old silver-mine tailings and extract cobalt, nickel and silver. "First and foremost, we are trying to remediate the environment," explains Paul Miller, vice-president of engineering at BacTech. "But by doing that, we also hope to recover valuable metals."

Metals can also be extracted from polluted water. Water sources near disused mines are often contaminated, as water drains through old waste dumps. In Germany a firm called GEOS has set up a pilot plant on a coal-mining site to clean the iron-laced groundwater using bacteria.

Organisms with slightly different dietary preferences, known as sulphur-reducing bacteria, show promise for removing dissolved metals from liquid industrial waste. Paques, a firm based in the Netherlands, has a commercial process for recovering zinc using such bacteria, and British researchers in Birmingham and Dundee have recently retrieved palladium and platinum in this way, too.

Interest in bioleaching shows no sign of abating. As part of a European project called ProMine, geologists are mapping Europe's mineral resources to a depth of 5km (3.1 miles) in an effort to stimulate the mining industry and reduce dependence on imports. Integral to the project is further development of biological metal-recovery methods. In Europe, at least, mineral-munching microbes can expect long-term employment-and lunch.

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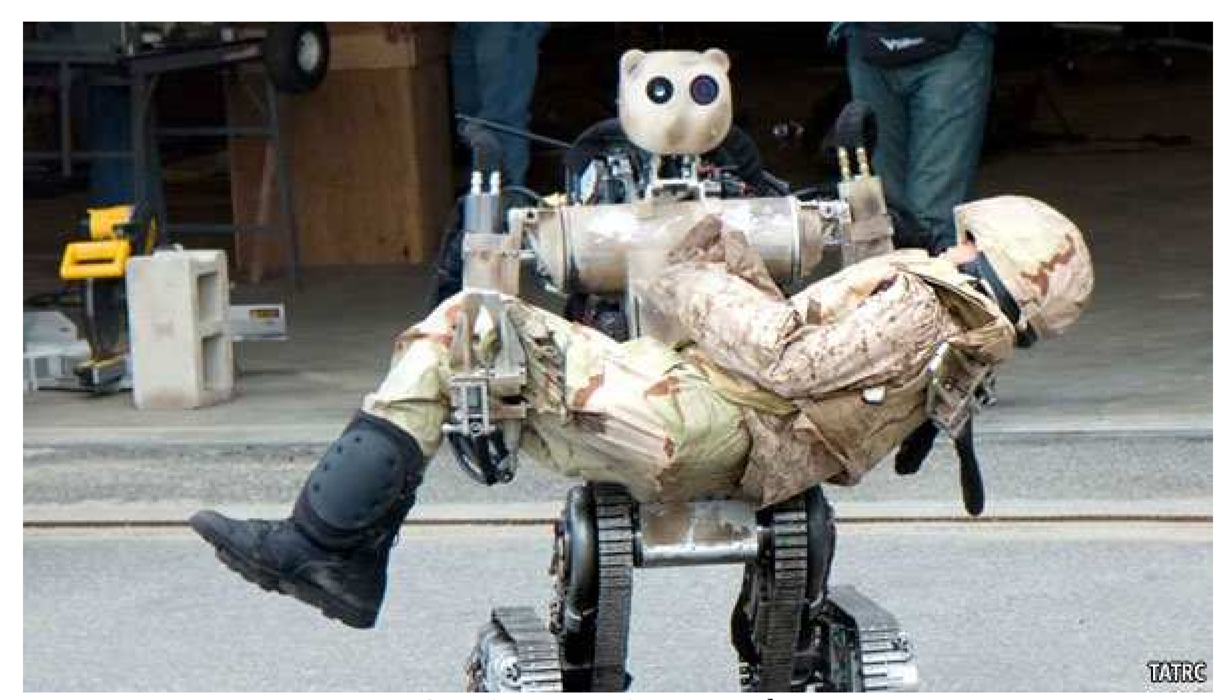
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Monitor

# Caught in a BEAR hug

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**Robotics: A newly designed robot can recover casualties from battlefields, and might also be able to make itself useful to soldiers in other ways**



Carrying out an important duty

KILLING a soldier removes one enemy from the fray. Wounding him removes three: the victim and the two who have to carry him from the battlefield. That cynical calculation lies behind the design of many weapons that are intended to incapacitate rather than annihilate. But robotics may change the equation.

The Battlefield Extraction-Assist Robot, or BEAR for short, is, in the words of Gary Gilbert of the United States Army's Telemedicine and Advanced Technology Research Centre (TATRC), "a highly agile and powerful mobile robot capable of lifting and carrying a combat casualty from a hazardous area across uneven terrain". When it is not saving lives, it can perform difficult and repetitive tasks, such as loading and unloading ammunition.

The current prototype BEAR is a small, tracked vehicle with two hydraulic arms and a set of video cameras that provide a view of its surroundings to its operator via a wireless link. It has been developed by TATRC in collaboration with Vecna Technologies, a company based in Maryland that invented the robot. Daniel Theobald, BEAR's inventor and Vecna's boss, says versatility is at the heart of the robot's design. "It would be completely impractical if you had robots with a sole duty to rescue soldiers, because they would spend most of their time unused," he says. "The whole idea from the start was to design a general-purpose robot."

The BEAR's operator can control the robot in two ways. One, a joystick, can be embedded into the grip of a rifle and manoeuvred by the soldier's fingertip when he is holding his weapon to his shoulder. The advantage of this is that he does not need to put his gun down to rescue his comrades. The other means of control, a special glove designed by AnthroTronix, another Maryland firm, can sense the wearer's hand movements and direct the BEAR accordingly. If, for example, the gloved hand moves to the left, the robot will follow. If the hand moves backwards, the robot will slow down or stop. If the glove's wearer closes his fist, the robot takes that as an instruction to grip an object with its arms.

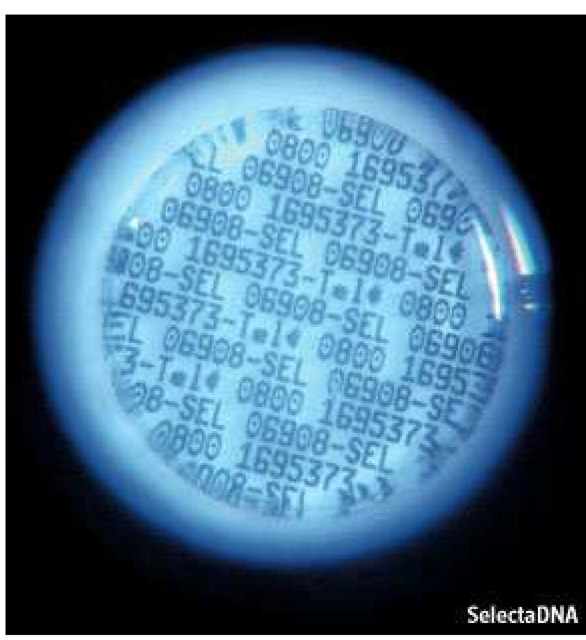
Over the past year BEAR has been tested at the army's Infantry Centre Manoeuvre Battle Laboratory in Fort Benning, Georgia. It has shown that it can travel at around 12mph (19kph) across a flat surface. It can also move over soil, sand and gravel, through trees and inside buildings, albeit at lower speeds. Several more years of tests are planned (this is the army, after all), but Dr Gilbert is optimistic that BEAR will come through them. If it does, soldiers will be able to get on with their primary job of killing the enemy, without having to worry so much about what the enemy has done to their friends.

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Monitor

# Do Not Attempt to steal

**Security technology: Special transparent adhesives, dabbed on valuables or sprayed on thieves, are helping police solve crimes**




Now anything can have a fingerprint

THE rising price of metals over recent years, fuelled by booming demand in China and other emerging economies, has caused thieves to turn their attention to things that would previously not have merited a second glance: rubbish bins, manhole covers, traffic lights, industrial piping and-perhaps most worrying-electrical cables, telephone lines and the wires that control railway signals. In one English county alone, the West Midlands, 52 thefts of metal from railways over the course of 18 months have resulted in the delay or cancellation of 1,500 trains, according to Tom Watson, a local member of Parliament. Indeed, Paul Crowther, deputy chief constable of the British Transport Police, the force responsible for keeping an eye on the railways, describes metal theft as the second-greatest threat, after terrorism, to Britain's infrastructure.

It would be useful, then, for scrap dealers who are offered metal objects of unknown provenance to be able to tell quickly whether they have been stolen and, if so, from whom, so that they can inform the police. Two small British firms, SmartWater Technology, based in Telford, and Selectamark Security Systems of Locksbottom, think they have worked out ways of letting them do just that.

SmartWater's invention is a special adhesive that can be painted onto objects that might be stolen. Though invisible in normal light once it has hardened, this adhesive glows yellow when illuminated by a beam of ultraviolet light. That, by itself, acts as a warning that goods might be stolen, but the real trick is what happens next. The adhesive also contains celluloid microdots the size of sand grains that have been imprinted with SmartWater's phone number and a code identifying the metal's owner. These can be read under a microscope and a quick phone call will reveal whether the goods are, indeed, stolen-or have been sold legitimately by an owner who has forgotten to clean them first.

Of course, a thief who believes his swag might have been so marked might attempt such cleaning himself. Thieves sometimes burn off the insulation on electrical cabling anyway. So SmartWater has found a further way to encode information in its adhesives-one which, unlike celluloid, survives fire. Besides the microdots, each batch also contains a unique combination of up to 30 compounds of rare-earth metals. Checking these is a bit more complicated than looking down a microscope. But if a dealer or the police have reason to suspect a piece of scrap might be stolen, then SmartWater's laboratory can tell them who bought the batch of adhesive in question.

Selectamark's technology also uses microdots, though instead of celluloid it employs polyester or a nickel-based alloy, depending on the type of adhesive involved. In place of mixtures of rare-earth compounds, its unique chemical markers are short stretches of DNA, each with a different sequence of genetic code.

DNA, indeed, seems to have a talismanic quality in the fight against crime. Even SmartWater, which does not actually use DNA, refers to its unique chemical identifiers as "synthetic DNA". Both companies say the mere act of alluding to their products as a type of DNA helps deter criminals-rather as the original DNA-identification technology was often referred to as "fingerprinting", even though it has nothing to do with fingerprints. Films and television shows have dramatised the use of DNA from crime scenes to convict miscreants, generating what Jason Brown, Selectamark's head of sales, calls a "DNA fear factor". The police concur, saying that when DNA warning signs are posted prominently, crime drops.

For those not deterred by magic words, though, both firms have an extra surprise. They also sell spray-can kits, to be installed above doors or near valuables. These are triggered by motion detectors or the press of a button by a shop assistant or householder. Even if a thief notices the mist, he is marked for days. The spray lodges in pores and creases in the skin, available to the swab of a curious police officer and branding the thief as effectively as his own DNA would, had he left any at the scene of the crime.

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# Beam it up

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**Energy: Laser beams can deliver energy to machines through thin air. This might be a good way to power drone aircraft or a space elevator**



This Pelican can hover

THE *Pelican*, a small, remotely controlled helicopter drone weighing less than a kilogram, is powered by a battery that provides about 20 minutes' flying. And yet, one evening last October, the *Pelican* took off, rose ten metres and hovered throughout the night. It was brought down in the morning only because the exhibition hall near Seattle, where it was airborne, was about to open for business.

This remarkable feat was achieved with the ingenious use of a laser beam. The laser, aimed from the ground at photovoltaic cells mounted on the *Pelican*'s underside, charged the chopper's battery, keeping her aloft for an unprecedented 12 hours and 27 minutes. An optical-tracking system kept the laser beam on target, creating a "scientifically exciting, yet a little boring" experience, according to Michael Achtelik of the *Pelican*'s German manufacturer, Ascending Technologies, after a long night monitoring flight data.

Keeping drones aloft is not the only putative application of power beaming, as this technology is known. Five years ago NASA, America's space agency, offered prize money to any team that could build a remotely powered robot able to climb quickly up a cable. Only in 2009, however, were the first of these prizes claimed, when three teams from America and Canada demonstrated climbing robots powered by lasers on the ground. LaserMotive, the Seattle company that designed the *Pelican*'s laser system, won $900,000 by powering a 5kg robot up almost a kilometre of cable dangling from a manned helicopter. LaserMotive's beam struck a photovoltaic panel on the robot, generating electricity that turned a set of wheels gripping the cable.

Conventional photovoltaic cells, made of silicon, are designed to collect energy from sunlight. LaserMotive uses special cells made with arsenic and gallium, which are better able to capture the near-infra-red wavelengths of its laser beam. The panel on the climbing robot, about the size of a coffee tray, harvested enough power to run a small lawnmower. One of LaserMotive's founders, Jordin Kare, reckons that a similar laser could deliver about as much energy 20km up if the panel were only a few times larger.

One reason NASA supports power beaming is that it hopes the technology could be used to help run a space elevator. This is a machine, familiar from science fiction, which some engineers think could be made science fact. In essence, it would be a giant cable reaching tens of thousands of kilometres into space to an orbiting satellite. Cable-climbing robots, powered by laser beams shot upward from the ground, or downward from space, would take payloads to orbit. Rockets would thus become redundant. Indeed, Andy Petro of NASA's technology office in Washington, DC, says power beaming might change the economics of space exploration completely. Lasers beamed from landing craft could, he says, power rovers in sunless areas of the moon or Mars, such as craters where water might be found.

Power beaming is also becoming more efficient. A few years ago lasers typically converted less than 40% of the electrical energy used to run them into beam power. The figure is now about 60%, and costs have dropped-the result of efforts to develop better laser printers, CD burners and even hair-removal devices. Moreover, engineers have worked out how to make laser beams more intense by using short lengths of optical fibre to narrow the beam. Such intense lasers are better suited to power-beaming because the cells that collect the laser light can be smaller.

The *Pelican*'s successful flight probably means that the first big application for power beaming will be supplying energy to drones. At the moment, most small drones rely on battery power, so their flights are short. LaserMotive reports that American army officials, including some responsible for special-forces kit, have expressed an interest in power-beaming systems for drones. DARPA, the American Defence Department's technology agency, is also sponsoring research into power beaming. British readers of a certain age may remember that the spaceships flown by Dan Dare, Britain's answer to Buck Rogers, were powered by "impulse waves", beamed from Earth. That piece of science fiction, too, may prove not to have been quite so wide of the mark.

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## Towering beauty?

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**Energy: A rather more elegant way to convey electrical cables across the countryside may be coming soon to a field near you**




A PYLON is supposed to be a beautiful thing. In ancient Egypt, pairs of tapering stone towers called pylons marked the entrances of temples. Christian architects borrowed the idea for the twin towers above the facades of many Gothic cathedrals. Whoever thought of appropriating the word for the ugly metal-lattice structures that carry high-tension power lines across the countryside was therefore guilty of both a public-relations triumph and an act of etymological vandalism. The latter, however, may soon be redeemed. The latest generation of electricity pylons are, in the eyes of some, at least, things of beauty in their own right.

The pylons in question have been designed by engineers at TenneT, the firm that runs the Netherlands' national electricity grid, in collaboration with KEMA, a Dutch research company. Instead of a single lattice tower, the cables are supported by two elegant steel poles up to 65 metres high. There are no arms. The six cables that pass from one pylon to another are each borne by two insulators attached to the poles. The resulting arrangement, though hardly invisible, is reasonably elegant. As much to the point, though, it has technological advantages. Although they have not been found to cause any harm, the cables on conventional pylons, which transmit a three-phase alternating current, generate a strong electric field and a continuous buzz of low-frequency radio waves. Some people who live near them fear this might be bad for their health.

TenneT's pylons should help allay that fear. Carrying all the cables in a "stack" between the poles, rather than hanging them separately on outward-facing arms, allows them to be arranged in a way that causes the individual fields generated by each cable to cancel each other out, weakening the overall field around the pylons. The result is far less low-frequency radiation. The combination of being less of an eyesore and producing less electrical smog should, TenneT hopes, soften objections to the construction of new overhead power lines.

That is important for two reasons. First, the alternative-burying high-tension lines-is expensive and largely futile. The cost of putting a cable underground is between four and ten times as much as that of carrying it on a pylon. On top of that, the field generated by an alternating current interacts with the ground more strongly than it does with the air. This creates losses 40 times higher in a buried cable than in an aerial one. Unless the long-distance-transmission system were converted to direct current (which reduces transmission losses, but brings problems of its own), burial of transmission lines is not a serious option.

The second reason TenneT's pylons may be important is that despite these problems, a lot of new long-distance-transmission lines are going to have to be constructed, and soon. Wind power from the North Sea and the Atlantic Ocean will require that. So, more speculatively, will the idea of generating solar power in north Africa and transmitting it to Europe.

In the Netherlands alone, TenneT says, more than 400km (250 miles) of new lines are needed. In Germany the state-owned energy agency, DENA, reckons the figure is more than 3,500km. At a recent meeting of the European Council, on February 4th, the leaders of the European Union's member states acknowledged that Europe needs a completely new power grid, a project they reckon will cost about euro200 billion ($270 billion). The overhead power problem is thus going to have to be solved one way or another.

In truth, of course, no pylon is ever going to be a more attractive feature of the countryside than no pylon at all. But if pylons have to be built-which they do-then something elegant and efficient is the least bad way of doing it.

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## Anonymous no more

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**The internet: It is becoming ever more difficult to browse the internet without leaving behind digital footprints that reveal your identity**




WAY back in the early days of the web, in 1993, the *New Yorker* ran a cartoon featuring two dogs sitting in front of a computer. The internet-savvy canine is saying to its friend: "On the internet, nobody knows you're a dog." This joke captured the freewheeling anonymity of the early stages of internet adoption, but it doesn't work now. Today websites often know a great deal about their visitors, including their names and interests.

The ability to use the internet anonymously is being eroded on several fronts. Some popular websites, including Facebook, the leading social network, and Quora, a popular question-and-answer site, require users to give their real names, and block people who are suspected of using pseudonyms. Other sites ask that users provide their real names in order to be able to leave comments, in the hope that discussions will be more civil if people have to reveal their identities.

In recent months security researchers have shown that if you use your real identity on some sites, you can be identified when you visit others. One way this can happen involves "cookies", the snippets of data that websites deposit on visitors' computers, so that returning visitors can be recognised. It sounds creepy, but cookies are generally anonymised. Cookies can reveal things about your browsing habits-they are used to target advertising, for example, based on other sites you have visited-but they do not usually know who you are.

In 2010, however, privacy experts twice pointed out that Facebook was sending information about its users to the same advertisers that track browsing using cookies. It is not known what, if anything, the advertisers did with this information. The potential, however, is clear: the Facebook data could have been used to deanonymise the browsing histories associated with the cookies. Facebook plugged this leak of personal information, but only after the problem was given prominent coverage in the *Wall Street Journal*. When the leak was highlighted by computer scientists in August 2009, nine months earlier, Facebook took no action.

Another anonymity-eroding technique was recently flagged by computer scientists. It relies on "history stealing", in which a security flaw in a user's web browser allows rogue websites to retrieve fragments of his browsing history. This may not directly reveal his identity, but can be very revealing. For example, if a user has joined three groups on a social network, there is a limited overlap between the groups' membership lists, and those lists are public, it may simply be a matter of working out who belongs to all three groups.

This sounds rather contrived, but it works in practice. Gilbert Wondracek at the Vienna University of Technology in Austria and his colleagues built a history-stealing website aimed at groups on Xing, a business-orientated social network. Mr Wondracek's analysis of over 6,500 Xing groups, containing a total of more than 1.8m users, suggested that his rogue

site would be able to determine the identity of around four in ten visitors. A trial run, in which Mr Wondracek invited colleagues who use Xing to visit his history-stealing site, showed this estimate to be about right. The vulnerability he exploited has since been addressed by the engineers behind several browsers, including Firefox and Safari, but has so far not been fixed in Microsoft's Internet Explorer.

Meanwhile, Facebook has quietly gained the ability to monitor its users' wanderings elsewhere on the web. Many sites now include Facebook "Like" buttons. Click one, and your Facebook profile will be updated with a message linking to the page in question. This feature helps people share content with friends, but it also allows Facebook to track its users' browsing. In fact, merely going to a page containing a "Like" button while logged into Facebook is enough to notify the social network of your visit, whether or not you click the button.

Where is all this heading? It is clear that many firms can now track people as they move around the web, and can sometimes link these browsing histories to specific individuals and their personal information. If the days of anonymous browsing are not over yet, some observers think they soon will be. As Julie Cohen, a legal scholar at Georgetown University, put it in a prescient paper published 15 years ago, the internet era is "as much an age of information about readers as it is an age of information for readers". Speaking at the Techonomy conference last year, Eric Schmidt of Google distinguished between privacy, which he said should be respected, and anonymity. "Absolute anonymity could lead to some very difficult decisions for our governments and our society as a whole," he said.

But anonymity is freeing. It lets people go online and read about fringe political viewpoints, look up words they are embarrassed not to know the meaning of, or search for a new job without being thought extremist, stupid or disloyal. In America some judges have recognised that browsing habits will change if people feel that they are being watched. In rejecting a government demand for book-purchase data from Amazon, an online retailer, a judge wrote that the release of the information would create a chilling effect that would "frost keyboards across America". Librarians have long understood this, which is why they keep readers' files confidential. But many of the new custodians of people's reading records do not seem inclined to do the same.

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# The right trousers

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**Robotics: An artificial exoskeleton, akin to a pair of robotic trousers, promises to bring hope and dignity to paraplegics by letting them walk**



Standing tall

CONFINEMENT to a wheelchair is not merely frustrating and degrading. It is positively bad for the health. People confined to wheelchairs often suffer urinary, respiratory, cardiovascular and digestive-system problems, as well as osteoporosis and pressure sores. Amit Goffer, an Israeli engineer, knows this all too well. In 1997 Dr Goffer had an accident that left him partially paralysed. Being an engineer, he decided to do something about it. The result is a pair of "robotic trousers" that he calls ReWalk.

The idea of a powered, artificial exoskeleton will be familiar to cinema-goers from films such as "Aliens" and "Avatar". In both of those movies, however, the device amplifies the user's power and strength. ReWalk, an exoskeletal version of the pelvic girdle and the legs' bones and muscles, has a more modest aim: to restore power and strength to the user's legs.

ReWalk consists of a set of plastic-covered aluminium struts, linked by actuator motors, that are strapped to the legs and waist, and a backpack. With these, and a pair of crutches for backup, a user can walk around. An array of sensors distributed along the struts and around the wearer's body feeds information to a computer in the backpack, which tells the actuators what to do.

The wearer starts by telling the computer what he is trying to achieve. A remote control strapped to one wrist offers several modes of action: "stand", "sit", "walk", and "ascend" and "descend" for staircases. Once strapped in, the user chooses "walk" mode, pushes his crutches outward and is off. Algorithms devised by Dr Goffer's colleagues at Argo Medical Technologies, the firm he founded to develop ReWalk, analyse the data from the sensors and use the result to operate the actuators. Experience shows the device can be worn all day without discomfort.

ReWalk is now undergoing trials in Israel, America and Europe. Two versions of the device are being developed. One, for supervised use in hospitals and rehabilitation centres, is already available for sale in Europe for euro87,500 ($120,000) and has just been approved in America. The other, for the unsupervised use of those who have undergone such training, is still under scrutiny, but Dr Goffer hopes it will be cleared for sale by the end of the year.

Dr Goffer says his aim is to enable paralysed people to lead normal lives. As well as giving users the ability to walk, the device also helps them regain their dignity. When someone is in a wheelchair his head is at the height of an average person's waist. This literal diminution of his stature can reduce his metaphorical stature, too. Once able to stand up, his stature, in both senses of the word, is restored-and that can be just as valuable as the health and mobility benefits.

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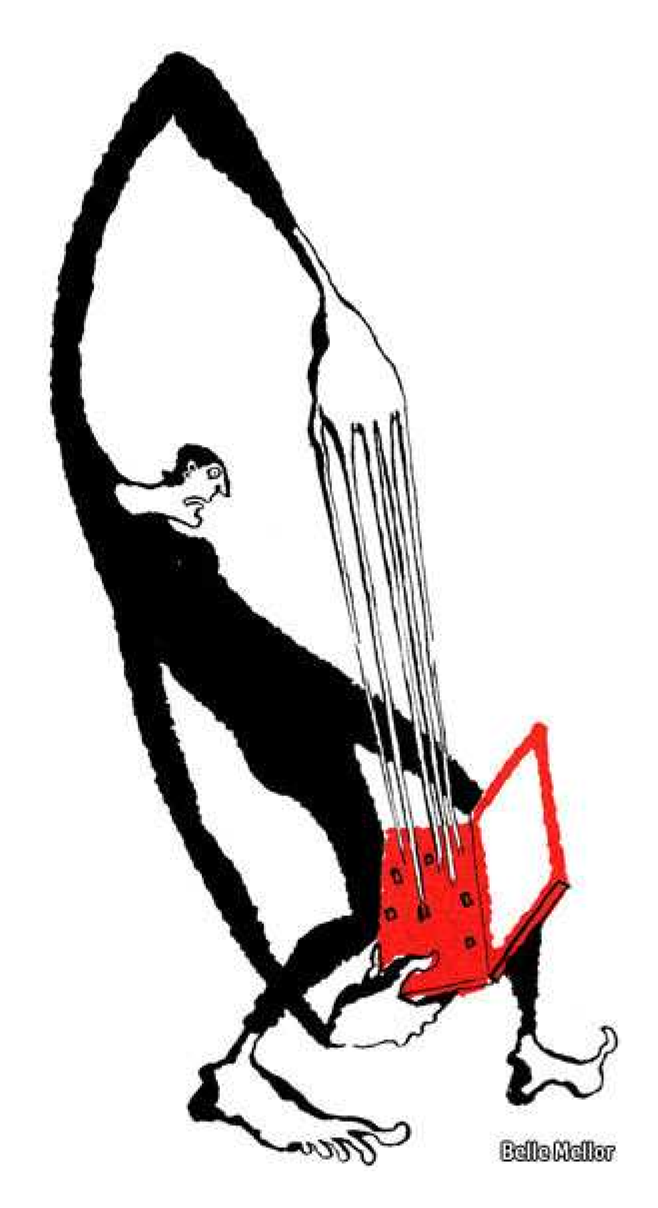
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Monitor

## Addicted? Really?

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**The internet: Mental-health specialists disagree over whether to classify compulsive online behaviour as addiction-and how to treat it**



CRAIG SMALLWOOD, a disabled American war veteran, spent more than 20,000 hours over five years playing an online role-playing game called "Lineage II". When NCsoft, the South Korean firm behind the game, accused him of breaking the game's rules and banned him, he was plunged into depression, severe paranoia and hallucinations. He spent three weeks in hospital. He sued NCsoft for fraud and negligence, demanding over $9m in damages and claiming that the company acted negligently by failing to warn him of the danger that he would become "addicted" to the game.

But does it make sense to talk of addiction to online activity? Mental-health specialists say three online behaviours can become problematic for many people: video games, pornography and messaging via e-mail and social networks. But there is far less agreement about whether any of this should be called "internet addiction"-or how to treat it.

Some mental-health specialists wanted "internet addiction" to be included in the fifth version of psychiatry's bible, the "Diagnostic and Statistical Manual of Mental Disorders", known as DSM-V, which is currently being overhauled. The American Medical Association endorsed the idea in 2007, only to backtrack days later. The *American Journal of Psychiatry* called internet addiction a "common disorder" and supported its recognition. Last year the DSM-V drafting group made its decision: internet addiction would not be included as a "behavioural addiction"-only gambling made the cut-but it said further study was warranted.

Sceptics say there is nothing uniquely addictive about the internet. Back in 2000 Joseph Walther, a communications professor at Michigan State University, co-wrote an article in which he suggested, tongue in cheek, that the criteria used to call someone an internet addict might also show that most professors were "addicted" to academia. He argued that other factors, such as depression, are the real problem. He stands by that view today. "No scientific evidence has emerged to suggest that internet use is a cause rather than a consequence of some other sort of issue," he says. "Focusing on and treating people for internet addiction, rather than looking for underlying clinical issues, is unwise."

Others disagree. "That would be wrong," says Kimberly Young, a researcher and therapist who has worked on internet addiction since 1994. She insists that the internet, with its powerfully immersive environments, creates new problems that people must learn to navigate.

No one disputes that online habits can turn toxic. Take South Korea, where ubiquitous broadband means that the average high-school student plays video games for 23 hours each week. In 2007 the government estimated that around 210,000 children needed treatment for internet addiction. Last year newspapers around the globe carried the story of a South Korean couple who fed their infant daughter so little that she starved to death. Instead of caring for the child, the couple spent most nights at an internet cafe, sinking hours into a role-playing game in which they raised, fed and cared for a virtual daughter. And several South Korean men have died from exhaustion after marathon, multi-day gaming sessions.

The South Korean government has since asked game developers to adopt a gaming curfew for children, to prevent them playing between midnight and 8am. It has also opened more than 100 clinics for internet addiction and sponsored an "internet rescue camp" for serious cases.

But compulsive behaviour is not limited to gamers. E-mail or web-use behaviours can also show signs of addiction. Getting through a business lunch in which no one pulls out a phone to check their messages now counts as a minor miracle in many quarters. A deluge of self-help books, most recently "Alone Together" by Sherry Turkle, a social scientist at the Massachusetts Institute of Technology, offer advice on how to unplug.

Pornography is hardly new, either, but the internet makes accessing it much easier than ever before. When something can be summoned in an instant via broadband, whether it is a game world, an e-mail inbox or pornographic material, it is harder to resist. New services lead to new complaints. When online auction sites first became popular, talk of "eBay addiction" soon followed. Dr Young says women complain to her now about addiction to Facebook-or even to "FarmVille", a game playable only within Facebook.

Treatment centres have popped up around the world. In 2006 Amsterdam's Smith & Jones facility billed itself as "the first and, currently, the only residential video-game treatment program in the world". In America the reSTART Internet Addiction Recovery Program claims to treat internet addiction, gaming addiction, and even "texting addiction". In China, meanwhile, military-style "boot camps" are the preferred way to treat internet problems. After several deaths, however, scrutiny of the camps has intensified.

Yet many people like feeling permanently connected. As Arikia Millikan, an American blogger, once put it, "If I could be jacked in at every waking hour of the day, I would, and I think a lot of my peers would do the same." Bob LaRose, an internet specialist at Michigan State University, doesn't believe her. In his research on college students, he found that most sense when they are "going overboard and restore self-control". Less than 1% have a pathological problem, he adds. For most people, internet use "is just a habit-and one that brings us pleasure."

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Monitor

# Bright sparks

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**Innovation Awards: We invite nominations for our annual prizes recognising successful innovators in seven categories**

THE ECONOMIST'S tenth annual Innovation Summit will take place in London on October 21st. Expert speakers will examine the latest trends in innovation, from the laboratory to the marketplace. For this year's tenth anniversary event we will be inviting all of our previous winners to participate. And at an awards ceremony on the evening of October 20th we will present this year's awards to successful innovators in a range of fields.

Accordingly, readers are invited to nominate outstanding innovators in seven categories: bioscience (which includes medical devices, pharmaceuticals, biotechnology and agriculture); energy and the environment; computing and telecommunications; "no boundaries" (including nanotechnology and other emerging fields); consumer products and services; business processes; and social and economic innovation, a category that recognises individuals who have pioneered technologies and business models that improve everyday lives. Nominees should be people, not companies, behind an innovation that has been a proven success in the past decade.

Please submit your nominations by visiting economistinnovation.com, where you will be asked to supply the nominee's name, affiliation and contact details, and a 200-word summary explaining why the person in question deserves to win in a particular category. The deadline is April 7th.

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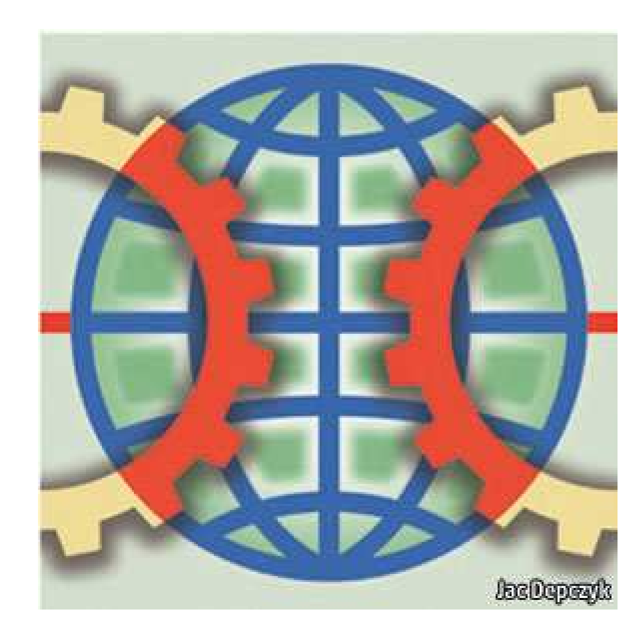
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Difference engine

# Renumbering the net

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**The internet: Just as car number plates and telephone dialling codes need to be updated every so often to allow for growth, so does the internet's addressing system. But it should not need updating again any time soon**



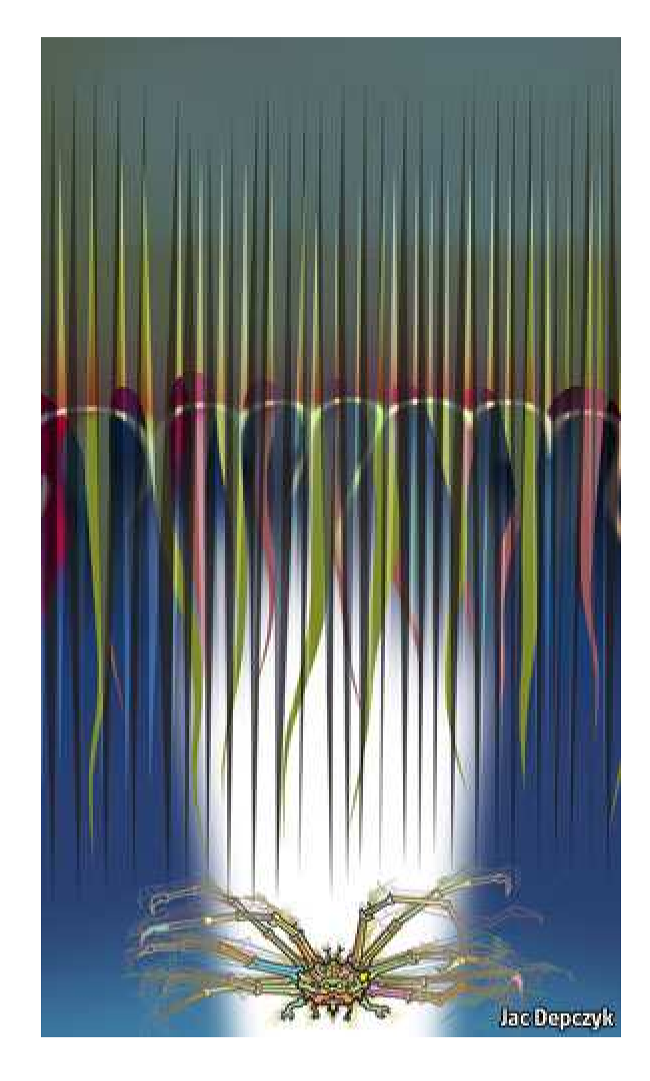

REMEMBER the panic over the "millennium bug", when computers everywhere were expected to go haywire on January 1st 2000, thanks to the way a lot of old software used just two digits to represent the year instead of four? Doomsters predicted all sorts of errors in calculations involving dates when the clocks rolled over from 99 to 00. In the event, the millennium dawned without incident.

Something similar is about to happen again, and this time it cannot be ignored. The problem is the exhaustion of internet protocol (IP) addresses-the four numbers ranging from 0 to 255, separated by dots, that uniquely identify every device attached to the internet. According to Hurricane Electric, an internet backbone and services provider based in Fremont, California, the internet ran out of bulk IP addresses on February 3rd.

The Internet Assigned Numbers Authority, which oversees such things, had doled out all its so-called "slash-eight" blocks of addresses to the five regional internet registries around the world. The registries are expected to allocate all their remaining addresses to local network operators over the coming months. After that, any organisation applying for new addresses will be told: Sorry, none left.

The issue is real and has been a long time in the making. *The Economist* first wrote about it ten years ago. The problem is that the current version of the internet's address system, called IP version 4 (IPv4), uses 32-bit numbers, and the total number of addresses possible with such an arrangement is therefore two raised to the power of 32-or roughly 4.3 billion in decimal terms. Back in the 1980s, when the internet connected just a couple of dozen research institutes in America, that seemed like a huge number.

But with the invention of the web in 1990 came an explosion in demand. It was soon clear that it was only a matter of time before the internet would exhaust its supply of addresses. Work on a replacement for IPv4 began in the early 1990s, with IPv6 finally being made available in 1998 (IPv5 was an experimental protocol for streaming audio and video that was abandoned). By giving the new internet version an address space of 128 bits, the designers pretty well guaranteed that it would not run out of unique identifiers for decades, or even centuries, to come.




Two raised to the 128th power is an enormous number: roughly 340 billion billion billion billion-or, as Martin Levy of Hurricane Electric likes to say, "more than four quadrillion addresses for every star in the observable universe". That will come in handy when the "internet of things" becomes a reality. Already, some 2 billion people have access to the internet, many of whom own multiple devices. The use of Wi-Fi base-stations and routers that allow sharing of a single IP address has put off the day of reckoning for a while. But add all the televisions, phones, cars and household appliances that are currently being given internet access-plus, eventually, every book, pill case and item of inventory as well-and the need for IPv6 is clear.

Though a vast improvement, IPv6 is not without its problems. The biggest is that it is not directly backward compatible with IPv4. To reduce the amount of processing the routing computers have to do as they direct packets of data over the internet, IPv6 was given a far simpler packet format. That speeds things up no end. But although the two internet versions can coexist on a single device, they have to operate as two separate networks. When an IPv4 device needs to communicate with an IPv6 device, various relay services and tunnelling tricks have to be employed, with IPv6 packets getting wrapped inside IPv4 packets and vice versa.

It seems likely that the two separate internets will have to live side by side for the foreseeable future. That could mean putting up with interoperability hassles for decades-in the United States, at least. Being the inventor and earliest user of the internet, America received the lion's share of addresses before today's rules were put in place. As a result, many large companies, universities and government agencies still have plenty of spare IPv4 addresses lying around unused. The pressure to upgrade has therefore been minimal.

That is not the case elsewhere. The biggest single demonstration of IPv6 to date was during the 2008 Summer Olympics in Beijing, when everything from live television and data feeds to security and traffic information was streamed over a vast

IPv6 network. Being a relatively latecomer to the internet, China has only one address for every four people. Hence Beijing's desire to adopt IPv6 as rapidly as possible. The same goes for Russia, South Korea and Japan. NTT, Japan's largest telecoms firm, has been offering IPv6 services to the public since 2000.

The next showcase for the new internet technology will be "World IPv6 Day" on June 8th. While doing all he can to help, Vint Cerf, one of the fathers of the internet (who now works at Google), warns that the day could be marred by painful configuration problems. But the main purpose of the event is to air precisely such difficulties and get their fixes circulated. Meanwhile the American Registry for Internet Numbers, which allocates blocks of IP addresses to internet service providers and other network operators throughout North America, has suggested that all public-facing websites in its region be ready to support IPv6 by January 1st 2012. Such initiatives should gradually move the internet from today's world, with islands of IPv6 systems in a sea of IPv4, to a world with islands of IPv4 in a vast ocean of IPv6.

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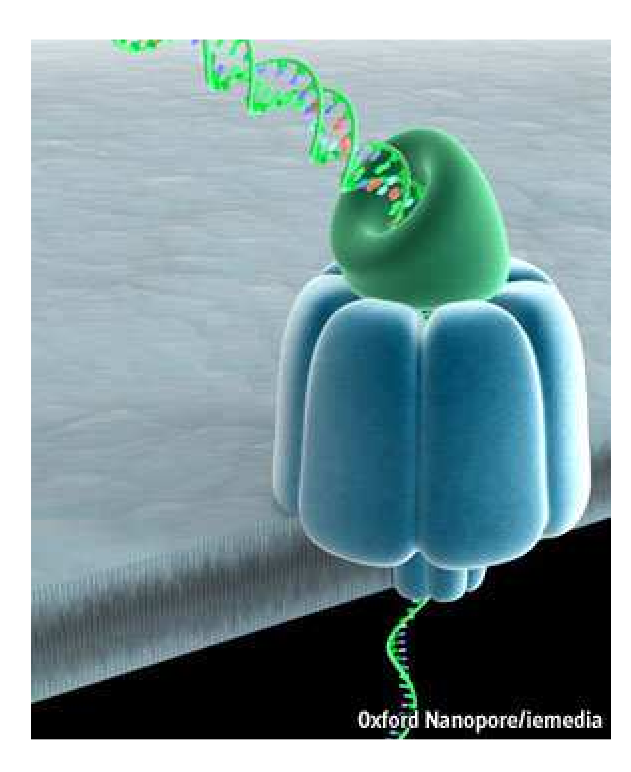
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Nanopore sequencing

# Towards the 15-minute genome

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**Genetics: Pulling strands of DNA through tiny holes, called nanopores, could dramatically speed up the sequencing of human genomes**




IT WAS one of the largest international scientific collaborations ever undertaken and it led, eventually, to a landmark accomplishment. Yet even with a budget of more than $3 billion and the participation of thousands of scientists, the process of mapping the human genome still took more than a decade. The technology has improved enormously since then: it is now possible to sequence a human genome in about eight days, at a cost of around $10,000. But researchers dream of being able to complete the process in a matter of hours, or even minutes, for less than $1,000. Genome sequencing could

then become routine, making it much easier to identify the genetic basis of diseases or isolate the factors that cause a drug to work in one patient but not another.

The most promising way to make such cheap, rapid sequencing a reality is an approach called "nanopore sequencing". This involves drawing individual strands of DNA through tiny nanoscopic holes, or pores. The idea is that individual base pairs (the four chemical "letters" of the DNA alphabet) can then be read off one at a time as they pass through the nanopore. "My own vision is a 15-minute genome," says Hagan Bayley, a chemist at the University of Oxford who is a pioneer in the field of nanopores. "While you are being diagnosed at the hospital your entire genome would be sequenced."

Sequencing technology has come a long way since the Human Genome Project, but it still requires DNA to be copied millions of times, a step called amplification, and labelled with fluorescent tags. It is a time-consuming process and a significant bottleneck, says Gordon Sanghera, the chief executive of Oxford Nanopore, a firm set up in 2005 to commercialise Dr Bayley's work on nanopores.

"Today all the systems that are out there have to chemically label the DNA and copy it so they have enough to read it," says Dr Sanghera. "So the current state of the art spends between five and ten days just preparing the DNA." With nanopores, however, virtually no chemical pre-processing is required and no amplification. Instead a single strand of DNA can be read, one base pair at a time, and without the need for labelling. Moreover, existing sequencing techniques involve breaking DNA into small chunks of less than 100 base pairs. These chunks have to be sequenced many times to find identifiable overlaps so that they can be pieced together, says Gustavo Stolovitzky, the head of the functional genomics and systems biology group at IBM, a computer giant. Nanopore sequencing can cope with much longer strands, which should help speed things up.

**The hole story**

Coaxing individual strands of DNA, some 50,000 times thinner than a human hair, through holes just a couple of nanometres wide (a nanometre is a thousand millionth of a metre) may sound impossible. But something similar happens in nature all the time, in the form of pore-forming proteins, called ion channels, that punch holes in the membranes of cells and selectively allow ions to pass through them. Many biological processes depend on the ability of ion channels to regulate the flow of ions through cellular membranes.

In the 1990s, inspired by the elegance of these proteins, Dr Bayley started looking at how ion channels could be used as biomolecular sensors. He started off with a lipid bilayer-a very thin biological membrane with a high electrical resistance. An ion channel is used to create a tiny hole in this layer, and a molecule with a slight negative charge is placed on one side of it. Applying a voltage across the bilayer causes the molecule to push its way through the pore to the other side. Crucially, as it passes through the pore, the molecule produces characteristic disruptions to the flow of current which can be used to identify what sort of molecule it is.

By 1996 Dr Bayley had found that using one protein in particular, alpha hemolysin (AHL), it was possible to get single strands of DNA, not just small molecules, to pass through a nanopore. This, he realised, might lead to a new way to sequence DNA. But threading a strand through an AHL pore and detecting the individual bases at the same time is very difficult. So Oxford Nanopore has also been looking at an alternative approach, called exonuclease sequencing, in conjunction with Illumina, an American firm that is the market leader in rapid sequencing. This also involves a nanopore in an AHL protein, but the DNA strand does not pass through the nanopore intact. Instead an enzyme, called an exonuclease, is attached to the top of the AHL. It cleaves individual base pairs from the DNA strand and feeds them through the pore to be detected one at a time.

Dr Sanghera says Oxford Nanopore has developed an electronic cartridge system called GridION, based on "lab on a chip" technology, for exonuclease sequencing. Each cartridge contains multiple nanopores (though the firm will not say how many) and all the microfluidics and electronics to carry out the preparation, detection and analysis. These are plugged

into a rack-like device that resembles a computer server. And, like servers, the racks can be combined in vast cabinets to carry out large-scale analysis, sequencing DNA or simply detecting small molecules or proteins. Dr Sanghera says this system is almost ready for commercial launch.

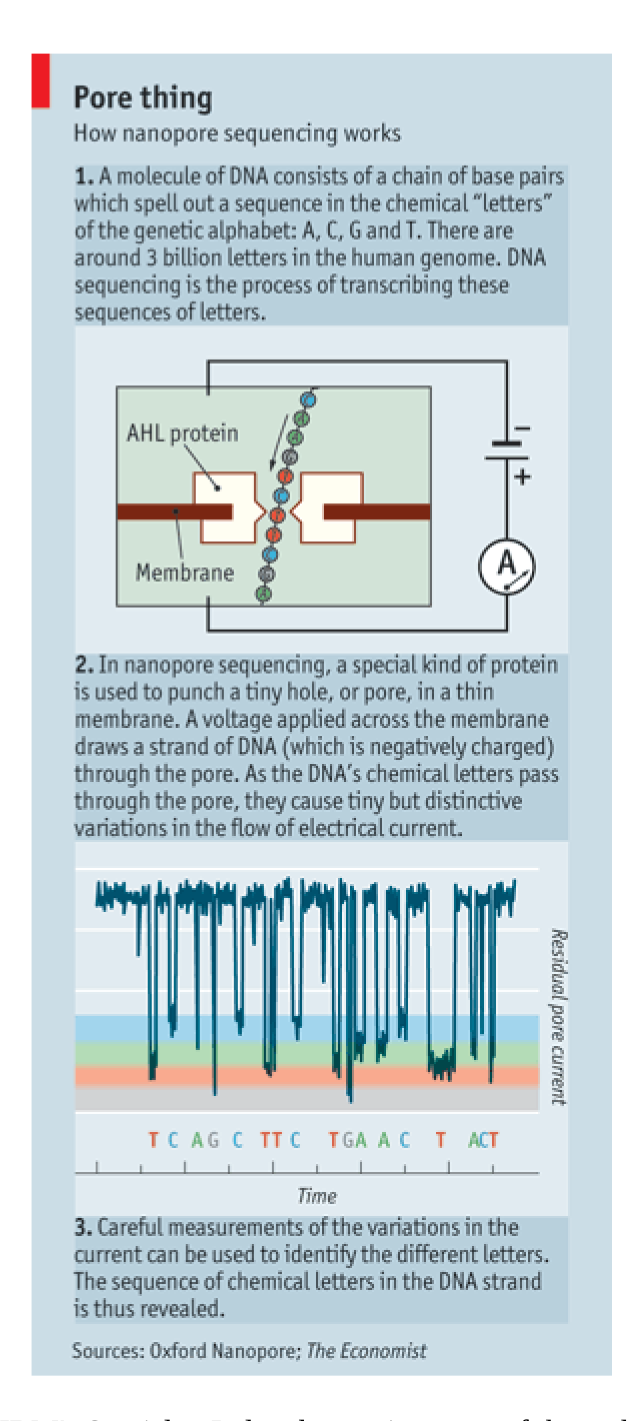
Even so, the ultimate goal is to perfect single-strand DNA sequencing, threading large sequences of DNA through nanopores and reading them as they pass through. This would be faster than exonuclease sequencing. It would also be more accurate: because the bases are still attached to one another, there is no chance that they will pass through the nanopore in the wrong order. One of the reasons single-strand sequencing is so difficult, however, is that the combined thickness of the protein and bilayer means that as many as 15 bases may be inside the nanopore at any one time. In addition, the speed at which the strand passes through must be carefully controlled to allow enough time to detect each of the bases.

**The ratchet effect**

In late 2010 Dr Bayley found a way to address the first of these problems, and Mark Akeson at the University of California, Santa Cruz, found a way to tackle the second. By modifying the AHL protein to create a constriction within the nanopore, Dr Bayley showed that it is possible to ensure that the variation in current is determined by a single base, which can then be identified. Dr Akeson, meanwhile, created a clever ratchet arrangement by attaching a polymerase enzyme to the AHL protein. This can ensure that the strand passes through the pore at a rate of one base every 20 milliseconds, which should be slow enough to detect each one.

Yet even a nanopore reading 50 bases per second would take about two years to sequence a whole genome, which contains around 3 billion genetic letters. So it will also be necessary to find ways to get lots of nanopores to work in parallel, says Dr Bayley, with each sequencing different sections of a genome simultaneously.

An alternative approach, which has been gaining ground in the past couple of years, is to dispense with proteins and create artificial nanopores in solid-state materials. IBM and 454 Life Sciences, a division of Roche, a drugs giant, have been working together to this end, using an electron microscope to punch three-nanometre holes in membranes that are ten nanometres thick. These membranes are made of three layers of a conducting material, titanium nitride, separated by insulating layers of silica. When a voltage is applied across the membrane, a strand of DNA is drawn into the pore. As it enters, a separate electric field is applied across the metal layers of the membrane, trapping the first base pair. By flipping this field's polarity the DNA strand can be ratcheted along, one base pair at a time.




This can be done very quickly, says IBM's Stanislav Polonsky, co-inventor of the technology. In order to get a strong enough signal to read the bases it is only necessary to trap each one for around a millisecond, he says. Most of this work has been carried out in computer simulation, but the ratcheting mechanism has been demonstrated in the laboratory. Moreover, it can move the DNA in both directions, which would have the huge benefit of allowing error correction to be carried out, says Stephen Rossnagel of IBM. If solid-state nanopores can be made to work, existing chipmaking technology could then be used to create massively parallel devices for well below $100 a chip, he says.

Others are also looking at solid-state nanopores, including Jene Golovchenko at Harvard University, with whom Oxford Nanopore is also collaborating, and NabSys, a spin-out from Brown University in Rhode Island. A variation of this approach uses nanopores in graphene, a sheet-like form of carbon that is one atom thick. Because such membranes are so thin, only a single base will be present within the pore at any one time, making detection easier.

According to preliminary experiments by one group, headed by Joshua Edel at Imperial College London, this approach should be able to sequence an entire genome in just a few minutes. Another group, led by Marija Drndic at the University of Pennsylvania, has found that adding a layer of titanium oxide a few molecules thick to the graphene membrane lets the

DNA pass through more easily and reduces the noise level when measuring the current, which should improve accuracy. Dr Bayley is looking into solid-state pores too, and is also exploring a hybrid approach that combines protein-channel nanopores with solid-state membranes.

There is a clear sense that the field of nanopore sequencing is gaining momentum, with new developments occurring almost every month. Dr Sanghera believes that the $1,000 genome will be possible "within three to five years". The benefits could be vast, he says. Cheap and rapid whole-genome sequencing will, for example, make it possible to sequence the entire genomes of cancerous and healthy cells in individual patients to see what has changed. It should become easier to determine which drugs will work best in a particular patient, and why. It will also be possible to construct a fine-grained picture of human evolution, and of how and when humanity spread around the world. Nanopores are tiny, but if they can be harnessed, the consequences could be momentous.

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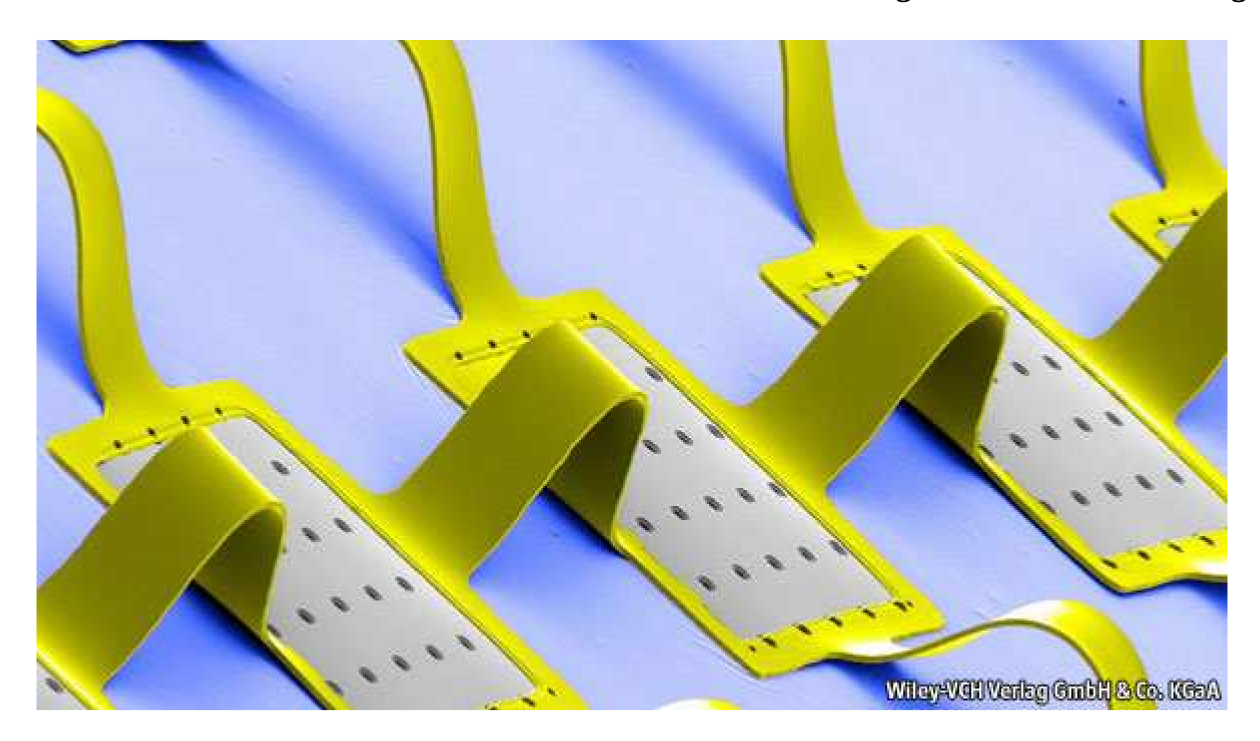
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Stretchable electronics

# A shapely future for circuits

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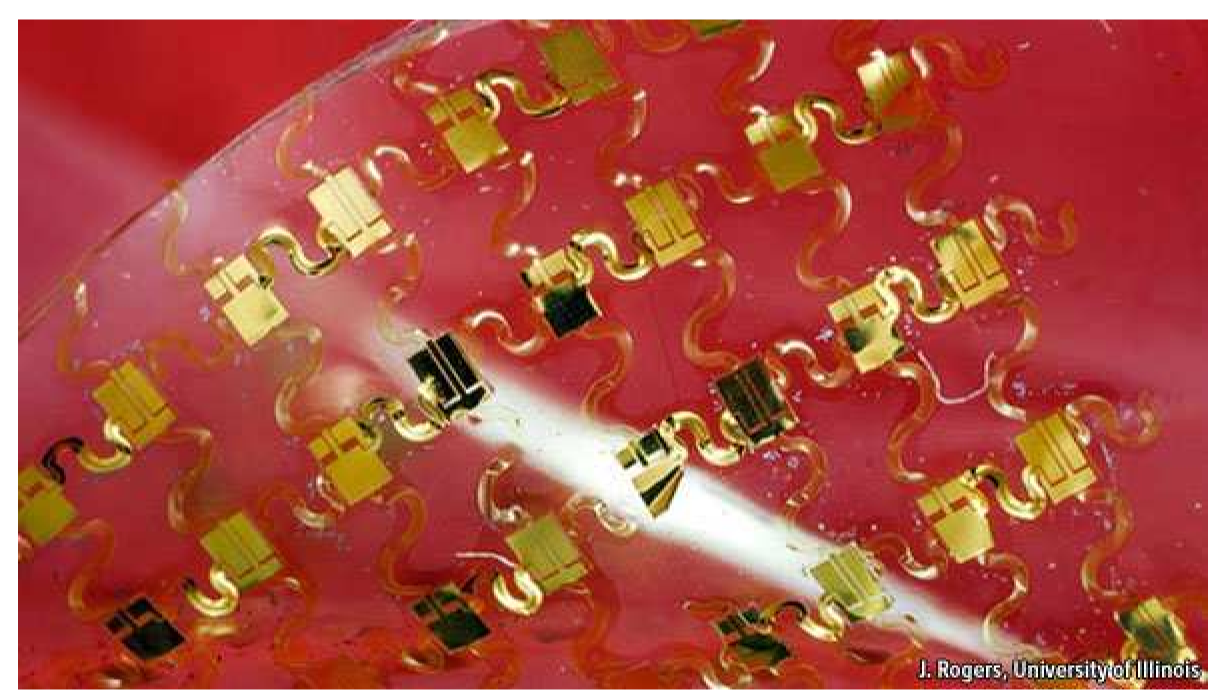
**Electronics: Flexible circuits that can bend and stretch with their surroundings could have a wide range of uses**




FOR years engineers have dreamed of building electronic circuits that would bend and stretch, rather than being confined to rigid chips and boards. Flexible circuitry would be able to do many things that rigid circuits cannot. Stretchable electronic skin could connect an artificial hand to the nervous system. Combat uniforms and helmets containing flexible, lightweight impact sensors could help medics prescribe better treatment if a soldier is wounded in an explosion. A neuroscientist who wants to understand the electrical storm that occurs in the brain of an epileptic patient could watch seizures unfold in real time with a circuit that conforms to the gyri of the brain. Flexible circuits would also make portable devices more resilient; they could be worn like clothing or jewellery rather than carried.

Researchers are pursuing a number of different approaches to making circuitry more pliable. Rigid chips and circuit boards will not be going away any time soon, because they are so inexpensive to manufacture on a massive scale. The trick is to find the appropriate ways to combine rigid and flexible circuit elements-and to identify the most promising applications for the bendy sort.

The fundamental difficulty in building flexible circuitry is that single-crystal silicon-the sort which is used to make high-performance components such as microprocessors and radio chips-is rigid. But in 2006 John Rogers, a materials scientist at the University of Illinois Urbana-Champaign, came up with a way to stretch single-crystal silicon without breaking it. Silicon itself doesn't naturally stretch, but the trick is in its preparation: it must be ultra-thin, only about 100 nanometres thick. (A nanometre is a thousand-millionth of a metre.) Any material is flexible if it is thin enough, says Dr Rogers. You can crumple a piece of paper, but not a plank of wood.



Silicon "islands" with flexible links (top and above)

**Flexible strategies**

He and his colleagues have developed two basic approaches to stretching circuits built on ultra-thin, bendable silicon. The first involves transferring ultra-thin sheets of silicon onto a sticky, rubber-like material that has already been stretched. When the rubber is released, the silicon buckles but does not break, forming a sort of herringbone pattern. Dr Rogers has designed entire circuits based on this principle, with working transistors, logic gates and oscillators.

The second way to stretch a circuit is to make tiny islands of rigid silicon and connect them with wires that provide the flexibility. This approach works because the islands are small enough to withstand small amounts of strain and the connectors are designed in such a way to accommodate any stretching. For instance, the wires can arc out of plane or spiral like springs.

Using the silicon-island approach, Dr Rogers and his colleagues recently demonstrated an eyeball-shaped camera in which the curve of the lens and an array of silicon sensors change shape to zoom in and out. Matching the curved lens with a curved sensor array reduces distortions that can occur when using the flat sensor-arrays found in most cameras, says Dr Rogers.

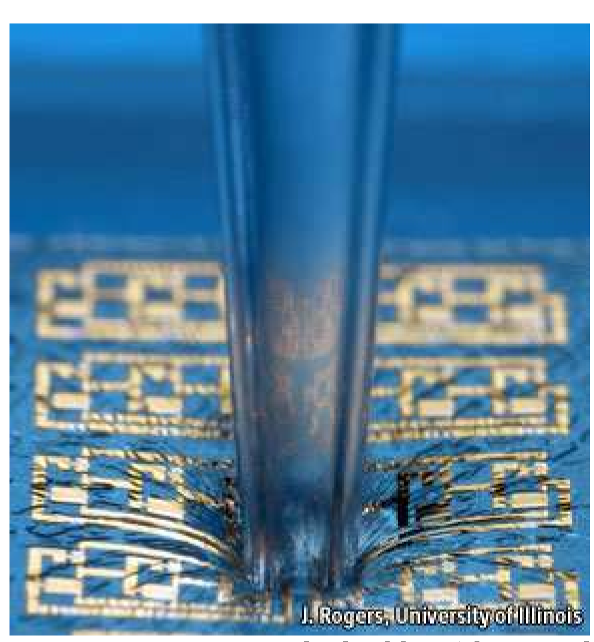
Another use for stretchable silicon is to make new types of medical devices that can reduce the invasiveness of certain procedures. One of Dr Rogers's projects, outlined in a recent paper in *Nature Materials* equips a standard balloon catheter,

used in angioplasty, with an array of sensors and radio circuitry. Instead of being an inert balloon that is used to break up a blockage, the sensor-laden catheter can monitor blood flow, temperature, pressure and electrical activity within the body. Wirelessly powered electrodes can also burn away tissue or cauterise as needed.

In December, MC10, a firm founded by Dr Rogers and based in Cambridge, Massachusetts, announced a partnership with Reebok, a sportswear-maker. The aim is to develop clothes that can monitor impacts on the body, strain on joints and an athlete's gait as well as heart rate, blood pressure and sweat pH. Although wearable devices that can monitor an athlete's heart rate already exist, MC10 hopes to make the sensors disappear into clothing. It is also working on combat vests and helmets that compute the intensity of nearby explosions and flexible sheets of sensors that can be used to map cardiac health.

Later this year Dr Rogers's team expects to publish a paper on a thin artificial membrane that could allow flexible sensor circuitry to be transferred onto a patient's skin, for example to produce an electrocardiograph. He likens the membrane to a temporary tattoo. He is also working on a thin, conformable sheet of electrodes to monitor electrical activity in a patient's brain during neurosurgery. This could be used to track seizures or map motor and speech centres. "We can do lots of things," says Dr Rogers, "and we're pursuing as many opportunities as we can handle."

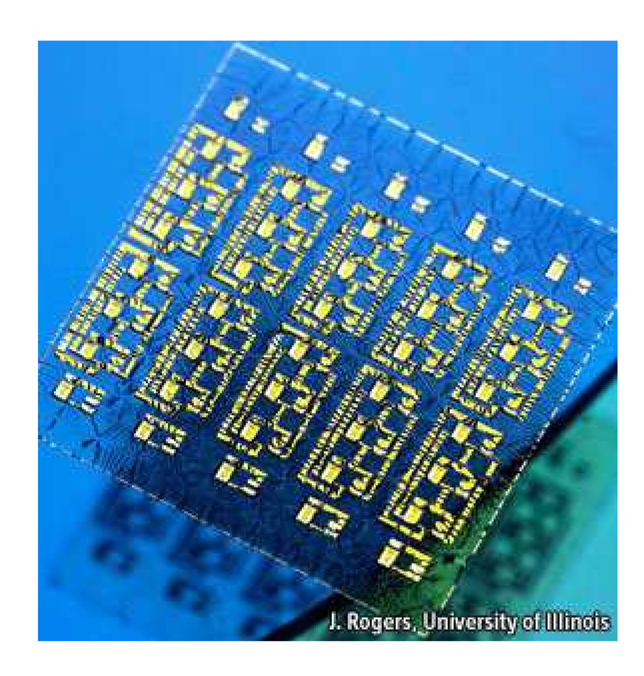
**Going organic**



Ultra-thin circuits on pre-stretched rubber (above and below)

Although high-quality single-crystal silicon may be the best-known material for making electronic components, it isn't the only one-and it's not the only one being teased into different shapes. Stephanie Lacour, a researcher at the Ecole Polytechnique Federale de Lausanne, is using organic transistors as pressure sensors on flexible materials, including silicone rubber, that can function as stretchable electronic skin. Organic transistors, as their name suggests, are made of carefully layered organic materials rather than being etched into a rigid crystal of silicon. Although they are flexible, they are not as small or fast as silicon transistors. But for sensing there is no need for extremely fast switching, says Dr Lacour.

The idea is that this flexible material could be wrapped around a prosthetic limb, with electrical signals from the sensors connected to an amputee's nerves to convey sensations. Dr Lacour has already made a prototype sensor with Nokia, a mobile-phone giant, consisting of a thin, stretchable, touch-sensitive film. This could be applied to the outside of a curved phone in place of a keyboard, or used to control a device in the form of a flexible wrist-band. Dr Lacour's stretchable electronic skin can be made using the same processes used to produce organic light-emitting diode (OLED) displays, which are found in many mobile phones.




Takao Someya of the University of Tokyo, who is one of the pioneers of electronic skin, has also built stretchable circuits using organic transistors on a rubber backing. He hopes to equip robots with sensitive skin to make them more aware of their environment. In addition, he has demonstrated a working OLED display on a stretchable surface. In a paper recently published in *Nature Materials*, he and his colleague Tsuyoshi Sekitani described some tricks to ensure that organic circuits continue to work even when drastically deformed. The backing material must be as smooth as possible, and the circuitry sealed beneath a layer composed of a polymer-metal-polymer sandwich. This acts as a barrier to oxygen and moisture to keep the device working. These tricks, they report, allow a flexible circuit to be bent with a radius of curvature of less than 0.1 millimetres-in other words, folded like paper-without breaking.

At Princeton University, meanwhile, Sigurd Wagner has also developed organic optical devices, including an organic laser on a stretchable rubber surface. Organic lasers are not as powerful as traditional lasers made with gallium or indium compounds, but they can be easily printed or deposited directly on any type of surface. In Dr Wagner's laser, the organic layer that produces laser light is deposited onto pre-strained rubber. When the strain is removed, it forms a ripply surface, and the spacing of the ripples affects the colour of the laser light, which varies as the material is stretched. Analysing the change in colour could thus be used to measure strain in buildings and bridges, Dr Wagner suggests.

Whether they are based on tiny slivers of silicon, organic circuitry or a combination of the two, stretchable devices will require power to operate. Stretchable electronics will need stretchable batteries, says Siegfried Bauer, professor of soft-matter physics at the Johannes Kepler University in Linz, Austria. Last year his group announced a new type of battery, based on standard zinc-carbon chemistry, that is capable of stretching. It pulls off this trick by using stretchy polymers, called elastomers, in conjunction with conductive gels, to transport charged particles between the battery's terminals.

Dr Bauer is also working on a stretchable battery that is rechargeable. And his team is looking for ways to exploit stretchable materials so that energy used to deform the material can be captured and converted to electrical energy-an idea known as "energy harvesting". This might allow devices to be powered by shoes or clothing that harvest energy from the wearer's movement, for example.

It may also be possible to make solar cells in a flexible, stretchable form. Dr Rogers and his colleagues are exploring a type of semiconductor material called gallium arsenide, which is usually inflexible, for just this purpose. He proposes dividing a rubber substrate into squares separated by trenches, and transferring tiny islands of rigid gallium arsenide onto those squares when the rubber is stretched. These tiny solar collectors would be connected with wires that form bridges over the trenches between the squares, and which buckle when the rubber is relaxed. This protects the rigid gallium arsenide components from strain, but the system as a whole is flexible and stretchable.

It is, in short, possible to see how logic circuits, input sensors, output displays and power supplies can all be made in flexible form. Traditional electronics are cheap and widespread today because they are made in huge quantities in extremely efficient factories. Stretchable electronics are not there yet. It is likely to be some time before you are offered a mobile phone in the form of a flexible rubber bracelet, a smart tattoo attached to your skin, or even an implant that flexes along with your body. But researchers have already taken the first steps towards such exotic devices.

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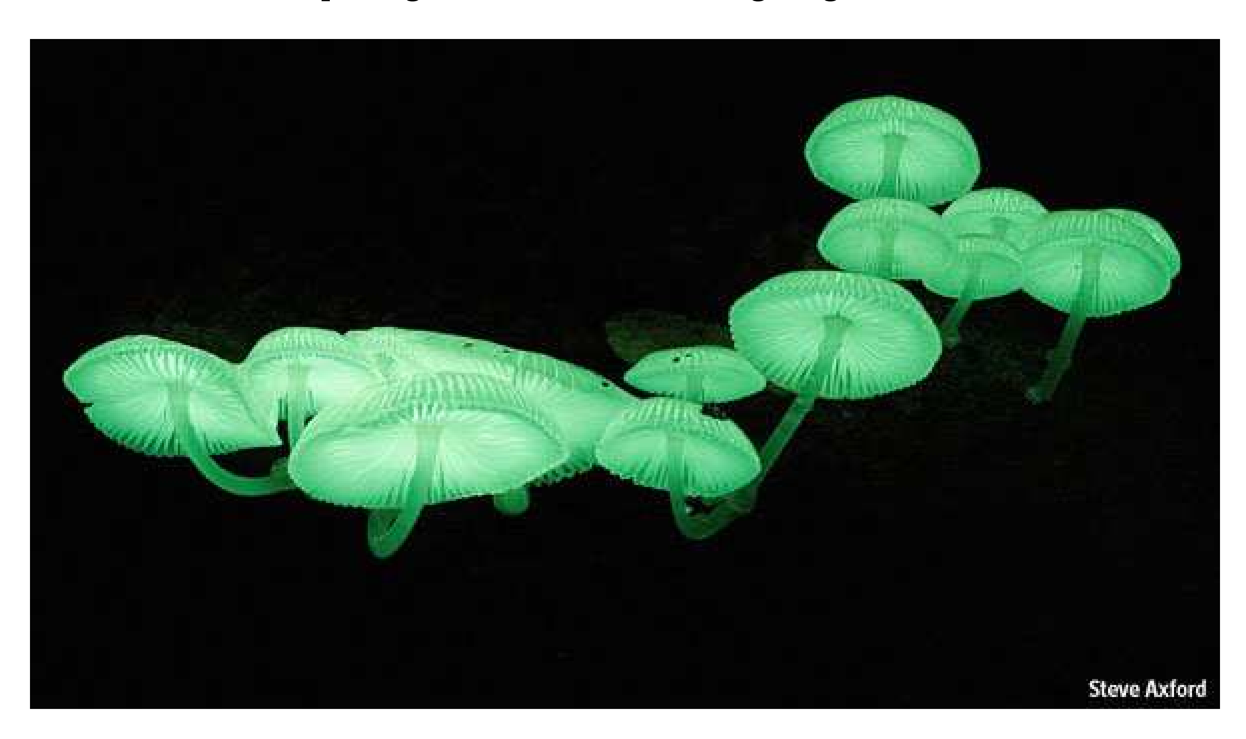
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Inside story

# How illuminating

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**Biotechnology: Scientists have uncovered the biochemical mechanisms used by living organisms to produce light, known as bioluminescence-and are putting those tricks to a dazzling range of uses**




FROM fungi to fireflies, fascination with light-producing organisms dates back to ancient times. Aristotle remarked on the phenomenon, known as bioluminescence, in the fourth century BC, observing that unlike the light from a candle, the light from fireflies and glow-worms was not accompanied by heat. In the first century AD Pliny the Elder, a Roman statesman, naturalist and writer, documented the glowing creatures near his home in the Bay of Naples, including glowing jellyfish and a species of glowing clam that was considered a delicacy in his day. "It is the nature of these fish to shine in darkness with a bright light when other light is removed...and to glitter both in the mouth of persons chewing them and in their hands," he wrote in his "Natural History". Pliny also described how he was able to make practical use of bioluminescence: a walking stick dipped in the glowing slime of a jellyfish, he observed, "will light the way like a torch".

Attempts to unravel the biochemical basis of this "living light" began with the pioneering chemist Robert Boyle in the 17th century, who discovered that bioluminescent fungus stopped glowing when the air was removed from a jar containing it. But it is only in recent years that researchers have determined the precise mechanism by which this biological light is produced. This has allowed bioluminescence to be put to a dazzling array of new uses, from

illuminating other biological processes to monitoring the spread of disease, detecting submarines and monitoring pollution. Glowing puppies have already been created, and there is talk of glowing trees and even glowing food.

The simplest light-producing reactions require an organic molecule, known as a luciferin, to be oxidised by oxygen, a process that is helped along by an enzyme known as luciferase. (The need for oxygen explains why Boyle's fungus stopped glowing when the air was removed.) The reaction generates light, carbon dioxide and a compound called oxyluciferin. Some organisms produce light using just this simple chemical reaction, but many require additional helper molecules, known as cofactors, to make it work. Fireflies, for example, which are some of the best-studied glowing organisms, rely on two cofactors: magnesium ions and adenosine triphosphate (ATP), a molecule that provides energy storage inside cells.

**Let there be light**

Many glowing jellyfish exploit a somewhat different reaction. Instead of having freely available luciferin, they contain molecules called photoproteins which are, in effect, luciferin proteins that already have oxygen bound to them. Like fireflies, they too rely on a cofactor, in this case calcium ions rather than magnesium.

The light-generating reactions used by fireflies and jellyfish occur in many other organisms. In addition, some organisms are also capable of fluorescence. The bioluminescing photoprotein inside the jellyfish species *Aequorea victoria*, for example, creates a blue light-yet the jellyfish itself emits a green light. This baffled researchers for years until it was discovered, in 1955, that the jellyfish has a special protein attached to every light-generating cell in its body. When exposed to the blue light from the bioluminescent reaction, this protein, called green fluorescent protein (GFP), glows bright green.

Having worked out the basics of bioluminescence, researchers started to tinker with them. In 1967, keen to test the possibilities presented by bioluminescence, Ellis Ridgway and Christopher Ashley, both then at the University of Oregon, collected photoproteins from 10,000 jellyfish and injected them into the muscle fibres of a barnacle. The researchers knew that as muscles contract they release calcium ions, and they suspected this would activate the injected photoproteins to generate blue light. They were right: they had produced glowing barnacle muscles.

This work, and other studies that made use of proteins collected from fireflies, showed that because bioluminescent reactions require certain cofactors to be present in order to function, they could be used to detect specific chemicals in an environment. But the process of collecting photoproteins from thousands of jellyfish was time-consuming, expensive, and not particularly practical for larger-scale studies. As a result, exploiting bioluminescent reactions was rather impractical.

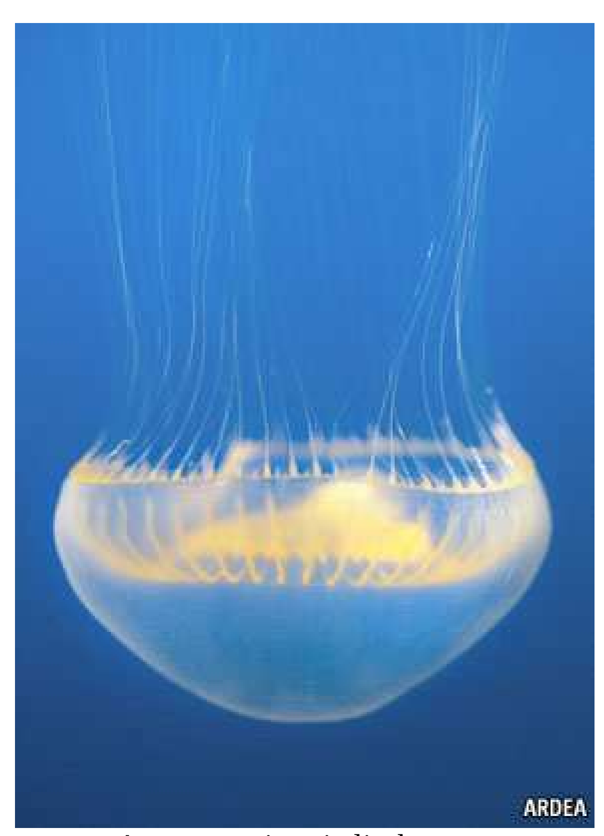
That changed with the invention of cloning technology. In 1985 Douglas Prasher at the Woods Hole Oceanographic Institution in Massachusetts and his colleagues used cloning to replicate the photoprotein found inside *Aequorea victoria*. This bypassed the problems associated with jellyfish collection and made it much easier to use bioluminescent reactions to detect the presence of calcium ions.

The cloning of luciferase from fireflies, which also took place in 1985, proved just as useful. Unlike jellyfish photoproteins, which require calcium to light up, luciferase from fireflies needs a ready supply of luciferin and ATP. In most environments ATP is not freely available, but because it is the main mechanism by which cells transport energy, it is present in living organisms. Researchers realised that adding luciferase and luciferin to a sample of water or food could be used to detect ATP, and thus determine whether the sample contained bacteria or other pathogens.

In 1992 Dr Prasher also cloned GFP, so that it no longer had to be harvested from living creatures. This expanded the possibilities for exploiting bioluminescence dramatically, because it meant that GFP did not have to be injected into tissue. Instead, the gene sequence for GFP could be added to the genome of a living organism, making possible new ways to track the behaviour of its cells.

Initially the technique was tested on bacteria such as *E. coli* to make them glow green when illuminated by blue light. Similar tactics have since been used to create much larger creatures that glow when exposed to deep blue light. One of the most intriguing is Ruppy, the ruby coloured puppy-a dog that glows bright red under ultraviolet light because it has genes in its body from a sea-anemone protein that functions very much like GFP, but fluoresces bright red instead of green.

This might seem pointless, but it permits exploration of animal processes that have long been mysterious. "The rainbow of fluorescent proteins now available to modern researchers is allowing questions that have vexed us for years to be finally answered," says Marc Zimmer, a computational chemist at Connecticut College.



Aequorea victoria lit the way

One such question, that of how damaged tissues regenerate, is being studied in salamanders by Elly Tanaka and a team of colleagues at the Max Planck Institute in Dresden. The salamander species that the scientists are working with, *Ambystoma mexicanum*, is more commonly called the Mexican axolotl and is well known for being able to regrow severed parts of its body, such as its limbs and jaws.

To shed more light on the process, the research team used genetic engineering to make axolotls that produce GFP throughout their bodies. The researchers took pieces of limb tissue-such as dermis, cartilage and muscle-from these transgenic animals and transplanted them into the limbs of ordinary axolotls. Once the tissues were safely in place, the recipients of the transplanted tissue had limbs amputated. The severing of the limb activated the tissues at the point of amputation, including the transplanted fluorescing tissues, and allowed the team to see how the different types of cells behaved during the regeneration process.

The researchers found that some tissues, like the dermis, could become other tissue types, like cartilage, but that others, such as muscle, were much less flexible and remained muscle throughout the process. Although the findings do not reveal how to regenerate a severed human limb, they do provide valuable information about how cells can be expected to behave as researchers move closer and closer towards that ultimate goal. "What fluorescent proteins are providing, in the axolotl experiment and so many others, is a new way of seeing," says Dr Zimmer. "Like the invention of the microscope, they are allowing us to watch what could never have been watched before."

## Making disease glow away

Bioluminescence can also be used to tag viruses-a technique that is proving invaluable for studying diseases. To understand how infections progress, researchers have traditionally had to kill infected laboratory animals on a daily basis. A lot can potentially be learned by comparing the tissues of an animal that has been infected with a herpes virus for only one day, say, with an animal that has been infected for several days. Through such comparisons, researchers can work out where the virus is travelling and, if the lab animal has been treated with a drug intended to counter the disease, how it is responding to the treatment.

The trouble with this technique is that studying the tissues of animals killed on a daily schedule is like taking a still image from a film every ten minutes and trying to work out what is going on; it provides only part of the story. To complicate matters further, not all lab animals respond to infections in the same way. Even two sibling mice may respond to a herpes infection very differently.

So David Leib of Dartmouth Medical School decided to try a different approach. He added the gene responsible for the formation of luciferase to the genome of herpes simplex virus type 1 and injected the modified virus into mice. The mice were also regularly injected with luciferin, so that the luciferase would have the fuel it needed to glow.

Because resulting light was so dim, Dr Leib worked with Gary Luker and David Piwnica-Worms at Washington University, St Louis, to place the animals in a dark box and photograph them using a special camera. The images collected by this camera showed the virus progressing through a single mouse at frequent intervals. "Suddenly we had the opportunity to track interactions between the virus and the immune system in real time and use far fewer mice," says Dr Leib.

Part of the reason luciferase can be seen by the camera, even through the tissues of the bodies of the mice, is that luciferase generates some red light in addition to the characteristic yellow-green light associated with fireflies. The yellows and greens cannot penetrate the mouse tissue but red light, being of lower frequency, can. Norman Maitland of the Yorkshire Cancer Research Laboratory at the University of York, together with a team of colleagues based at 14 labs within the European Union, used this idea to develop a series of viruses that carry a gene for GFP which has been modified to glow red, and are specially designed to find and grow inside prostate-cancer cells.

When these viruses are exposed in the lab to tissue cultures which contain cancer cells, they infect those cells and splice the gene for the red glowing protein into the gene sequences of the cancer cells, making them glow. In addition, the gene for the glowing protein is passed on by the cancer cells as they replicate, so that their progeny glow too. Dr Maitland has to use specialised camera equipment to see the glowing red cancer cells inside the human body. But he has already been able to demonstrate that infecting cancer cells with a red glow can help reveal prostate tumours. And in future, tracking the glow may help reveal how cancer cells behave when a tumour starts spreading cancer around the body. Christopher Rose, chief technology officer at Vantage Oncology, a provider of cancer treatments in California, says the use of bioluminescence is "a terrific way to better understand tumour behaviour".

It also has applications in surgery. A team led by Quyen Nguyen, a surgeon at the University of California, San Diego, has devised a way to illuminate nerves so that they are less likely to be cut accidentally, causing lasting damage. The researchers created a molecule that binds preferentially to nerve cells, and labelled it with a fluorescent tag. When it is injected into a mouse, it spreads around the animal's body, so that all its nerves (though not its brain or spinal cord) become fluorescent within two hours. The effect wears off a few hours later. The technique has also been shown to work in human tissue, though it has yet to enter formal trials.

## In a different light

Bioluminescence clearly has great potential in medicine. But it also has a role in war. For reasons that are not entirely understood, many marine organisms bioluminesce only when disturbed. Scuba divers swimming at night will often find

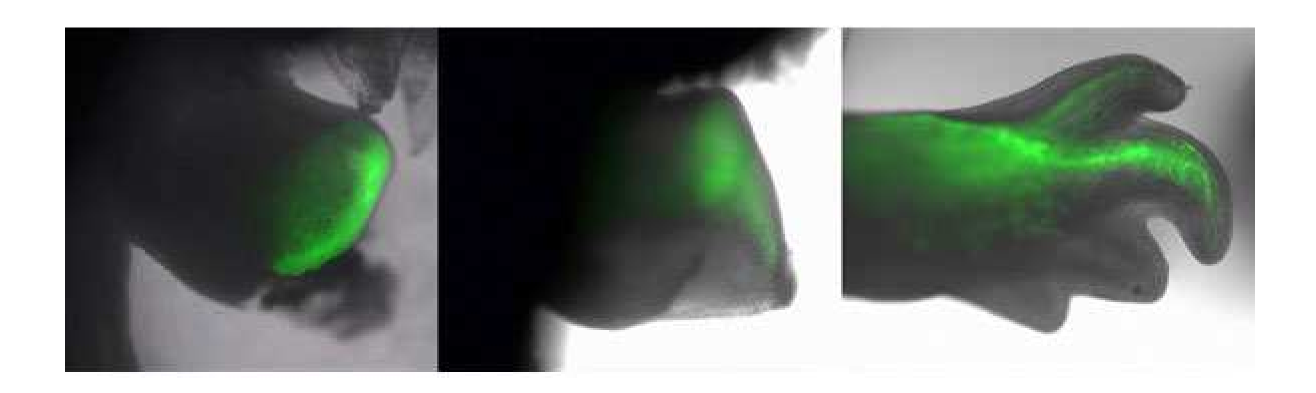
that just waving their arms around creates a dazzling green glow. Large animals, like passing whales and dolphins, can also create enough disruption to produce a glow, as will passing boats.

"The US navy has long had an interest in bioluminescence-it started during the cold war because of submarine detection," explains Edith Widder, a senior scientist at Ocean Research & Conservation Association, a conservation group. Indeed, one of the last German submarines to be sunk during the first world war had disturbed enough bioluminescent organisms in the Mediterranean to produce a glow that could be seen from above the surface. This light was used to track the submarine and destroy it.

Specifically, America's navy wants to be able to forecast whether a vessel in a particular location might cause a bioluminescent glow that would give away its position, says Dr Widder. So, together with James Case at the University of California, Santa Barbara, she devised a device that measures marine bioluminescence by pumping water through a grid that excites bioluminescent organisms and measures how brightly they glow. A network of such devices could reveal where vessels can operate undetected, or where special operations forces can come ashore without being given away. "The first system cost $500,000 and was the size of a motorcycle," says Dr Widder. Newer versions are the size of waste bins and cost $10,000.

Bioluminescence monitoring has other uses too, such as detecting pollution. Dr Widder is working with a bioluminescent bacterium species called *Vibrio fischeri* that is sensitive to a wide variety of pollutants. Its ability to bioluminesce is linked to its respiration, and its respiration is almost always depressed when it is struggling with pollution. Measuring the brightness of the bacteria thus provides a simple way to determine pollution levels. "We know things are really bad when the light goes out," says Dr Widder.

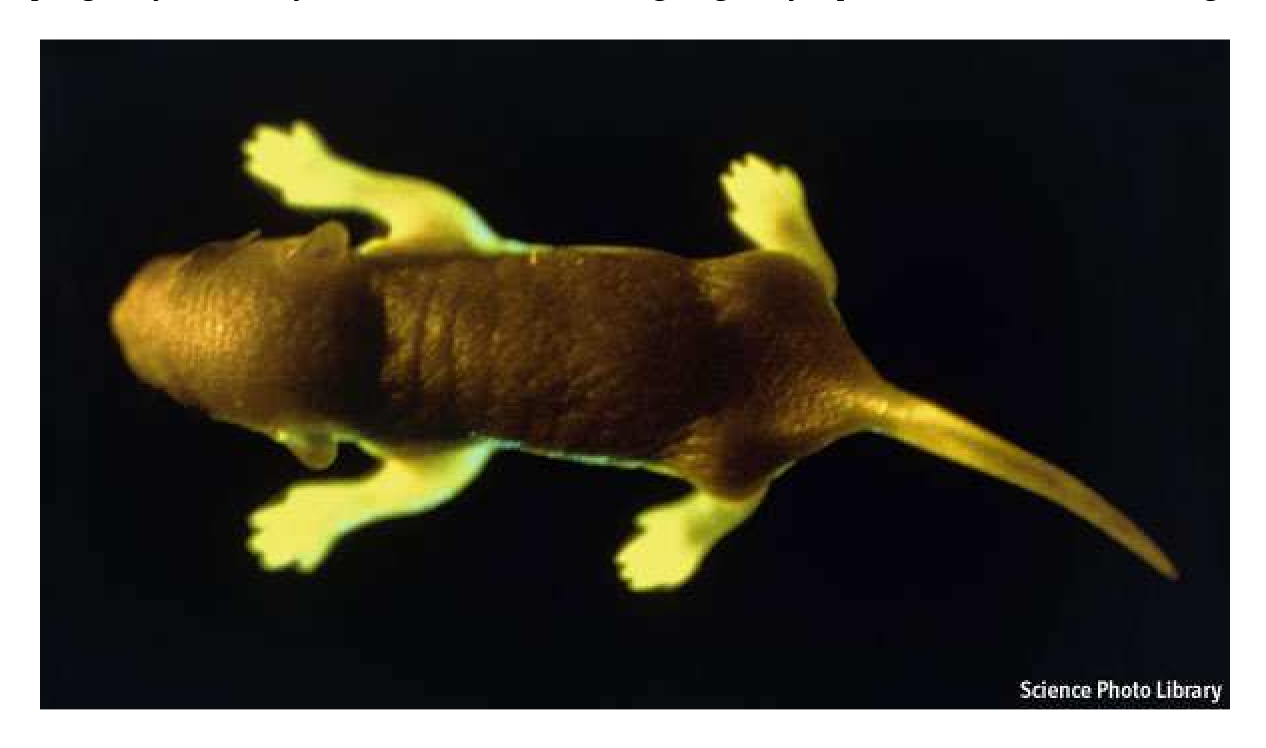
Jan van der Meer at the University of Lausanne in Switzerland is taking the idea of using bioluminescent bacteria as pollution monitors a step further, by tinkering with their genetics. It is neater, he says, to have organisms that glow brighter, rather than becoming fainter, as the environment becomes more toxic. Unfortunately there are no organisms that do this naturally. But using genetic engineering Dr van der Meer and his colleagues have coupled the light-generating reactions in bacteria to metabolic processes associated with handling pollution. Linking light-generating reactions with these reactions, rather than respiration, makes the organisms glow brighter as the pollution level increases.



Martin Kragl

Monitoring the regrowth of salamander limbs (above) and a glowing mouse (below)

And because different bacterial species are sensitive to different pollutants, different coloured glows can indicate the presence of specific chemicals. Dr van der Meer imagines his genetically modified bacteria being used at sites where chemical spills or oil leaks are suspected. "A sample of water can be exposed to the bacteria, and the light generated allows a quick analysis to be made without the need for the usual high-end equipment," he says. The bacteria could be housed in sampling buoys in watery environments, with readings regularly reported to a central monitoring station.




The potential ecological benefits of bioluminescence do not end with detecting pollution. In November 2010 a team of undergraduates at the University of Cambridge took the first steps towards engineering bioluminescent trees that could replace streetlights, thus reducing electricity consumption and related carbon-dioxide emissions. They took genes from fireflies and bioluminescent marine bacteria and modified them to produce a genetic package that can be easily added to other organisms to make them glow. The package includes genetic modifications to enable organisms to recycle oxyluciferin, the by-product of the reaction that produces light. To demonstrate their approach they added the genes to a bacterium, and found that a flask of the bacterial culture produced enough light to read a book by.

Another potential use for glowing plants is to indicate the health of crops. "You can put luciferase into plants and tether it to plant stress genes to make sure crops are healthy," says Laurence Tisi, a bioluminescence researcher at Lumora, a molecular-diagnostics company based in Britain. A field would glow in areas where insects were attacking the crops, allowing insecticides to be deployed appropriately. Plants could also glow when they need water, to keep irrigation to a minimum. Researchers at the University of Edinburgh, in Scotland, have already developed potatoes that do just this.

Even so, Dr Tisi is sceptical. "I am uncertain that any crops that glow in the dark are going to be of much interest to consumers," he says. "Glowing things make people wary." Yet BioLume, a privately held biotechnology company based in North Carolina, believes such concerns can be overcome. It is developing bioluminescent proteins for use in the food industry, and hopes to incorporate them into a range of products, from glowing icing on cakes to glowing lollipops and chewing gum. BioLume could be onto something. Glowing food was, after all, highly fashionable in Roman times-and perhaps, given the dramatic progress that is now being made in the exploitation of bioluminescence, it will be once again.

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GPS jamming

# No jam tomorrow

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**Navigation: As the uses of satellite-positioning technology continue to grow, what can be done to stop deliberate and dangerous jamming of the signals?**




NO AEROPLANES fell out of the sky and no one died. But in late 2009 engineers noticed that satellite-positioning receivers for a new navigation aid at Newark airport in New Jersey were suffering brief daily breaks in reception. Something was interfering with the signals from orbiting global positioning system (GPS) satellites. It took two months for investigators from the Federal Aviation Authority to track down the problem: a driver who passed by on the nearby New Jersey Turnpike each day had a cheap GPS jammer in his truck.

Such devices are illegal to sell or use, but they have become popular with commercial drivers who object to their employers tracking their every move. A jammer prevents a tracking device in the vehicle from determining (and then reporting) its location and speed-but it also disrupts GPS signals for others nearby.

Although the incident did not have disastrous repercussions or make front-page headlines, it did ring alarm bells with senior aviation and law-enforcement officials. America's military developed GPS from the 1970s, and satellite-based positioning, navigation and timing (PNT) have since become crucial to all kinds of civilian infrastructure systems. Most people know that satellite signals are used by automotive "satnav" devices, but few realise how everything from aviation, financial-securities clearing, mining and electricity distribution to mobile telecoms, road tolling and weather forecasting also relies on GPS. Among other things, its signals are used to synchronise the clocks in mobile-phone base stations, steer combine harvesters and keep oil platforms in position.

Specialists have been warning for years that this growing dependency is a potential vulnerability. As long ago as 2001 a report from the Volpe Centre, a transport-research body in Cambridge, Massachusetts, described GPS as a tempting target for exploitation by "malicious persons". America's GPS and Russia's GLONASS are currently the only functioning global navigation satellite systems (GNSS), but Europe's Galileo and China's COMPASS systems are under construction.

**We're jamming**

All of them share a fundamental weakness, however. Because they rely on signals from satellites transmitting from an altitude of around 20,000 kilometres (12,400 miles), the signals are very weak, making them vulnerable to accidental or deliberate interference. This can take the form of natural interference, as a result of solar activity, for example; accidental man-made interference due to signal reflection or faulty transmitter equipment; and deliberate jamming of the satellite signal by transmitters that drown it out by broadcasting their own signal on the same frequency.

British police began finding jamming equipment in the possession of criminals about three years ago. This was not surprising, because evidence from satnavs and vehicle-tracking devices had already been used in several successful prosecutions. In July 2010 two men were jailed for a total of 16 years after they admitted being members of a gang that stole 40 lorries and their loads with a total value of pound6m ($9.6m). They had used GPS jammers to prevent the vehicles being tracked after the thefts. In Germany, meanwhile, some lorry drivers have used jammers to evade the country's GPS-based road-tolling system.

"If you do an internet search on GPS jammers, you get over 300,000 hits, with many of these linking to sites offering them for sale," says Jim Hammond of the intelligent transport systems working group at Britain's Association of Chief Police Officers (ACPO). "I'd suggest you don't get that level of hits for products that nobody buys." ACPO and Britain's communications regulator, Ofcom, are urging the government to make it easier to prosecute people who use and sell jammers, and to make their possession a criminal act.

In November America's National Space-Based PNT Advisory Board said deliberate disruption of GPS was becoming more common, and that the systems in place to find and stop jammers were insufficient. It called for the rapid development of new ways to shut down sources of interference, new laws to punish offenders more harshly and for alternative, non-GPS-based backup systems to be deployed.

In Britain such efforts are already under way. "Efforts to combat interference and jamming have accelerated in the last couple of years in response to a rapid rise in the sale and use of jammers," says David Last, a former president of the Royal Institute of Navigation and a GPS consultant to the British government. The Technology Strategy Board, a body set up to promote innovation, has provided pound3m ($4.8m) in funding for research projects in this field, called GAARDIAN and SENTINEL.

The GAARDIAN consortium, which completes its work this month, has developed equipment to provide real-time information about the reliability of GPS at airports or other sensitive locations using networks of probes. Each probe can pick up GPS signals and signals from eLoran, an enhanced version of Loran, the ground-based terrestrial radio-navigation system first used by the American and British navies during the second world war. The probes also contain a small atomic clock. By comparing the GPS and eLoran time signals with its internal clock, each probe can detect interference and determine whether it is natural or man-made.

The ability to detect man-made interference is not much use unless the source can be located, however. That is where SENTINEL comes in. It is a new research project announced in December by Chronos Technology, the British firm that leads the GAARDIAN consortium. The idea is to use probes similar to those used in GAARDIAN, but interconnected in such a way that the position of a jamming device can be determined by triangulation. "If there is a power loss on one probe, and weaker power losses in other probes, that could help us pinpoint the source of the problem," says Andy Proctor of Chronos.

In America there is already a military system to spot GPS interference: the GPS Jammer Detection and Location (JLOC) system run by the National Geospatial Intelligence Agency. According to Navsys, the company that developed JLOC, it involves a network of GPS receivers capable of detecting regions of higher than normal signal levels and low signal-to-noise ratios, either of which can indicate interference. But it is unknown how many sensors there are in the JLOC system, or how accurately it can determine the location of a jammer.




Some experts in the field are sceptical that it will be possible to develop cost-effective systems to locate low-power, short-range jammers around civilian infrastructure. It would require a very dense network of sensors, says Dr Last. "I suspect we have reached the stage where close to any major highway you cannot expect to operate a high-availability GPS system without it failing from time to time," he says.

At a GNSS conference in Portland, Oregon, last September, Phil Ward, president of Navward GPS Consulting in Dallas, Texas, proposed an elegant solution. Even low-power jammers could be detected, he suggested, if legislation was passed requiring smartphones, many of which now contain GPS receivers, to look out for jammers and warn other phones nearby if one is detected. The phones would then collectively determine the jammer's location and report it. It is a clever idea, but it would take years to implement.

Navsys may have found a way to speed up the process, however. It says it has received encouraging feedback from America's Defence Advanced Research Projects Agency (DARPA) in response to a recent proposal to develop an app that would turn smartphones running Google's Android software into JLOC sensors. Members of the emergency services, or even members of the public, would then be asked to download the app and leave it running on their phones. This could provide the high-density detection network necessary to locate small jammers.

**A down-to-earth alternative**

Another way to cope with jammers is to deploy backup systems that do not depend on satellite signals, but rely on terrestrial signals instead. In America radio-navigation and air-traffic-control systems based on terrestrial beacons, which predate GPS, were supposed to be phased out by 2018 in favour of satellite-based alternatives, under a modernisation programme called NextGen, overseen by the Federal Aviation Administration (FAA). Switching to satellite-based air-traffic control would, for example, allow more direct routes and save fuel, because aircraft would no longer have to follow a wiggly route from one ground-based beacon to another.

In a paper presented at the NAV10 conference in London in December, Mitch Narins, chief systems engineer at the FAA, and colleagues described the Newark jamming incident as "a valuable lesson" because it highlighted the risks of becoming too dependent on satellite-based systems that were vulnerable to disruption. Mr Narins and his team are now investigating whether the old-style terrestrial systems can be modernised and extended to provide a backup that could take over in the event of GPS failures. They expect to make their recommendations in 2013 or 2014, in time for implementation to begin in 2016.

Elsewhere, eLoran is another non-satellite-based alternative which has many cheerleaders. It is an enhanced version of Loran-C, which is itself an improved version of the original Loran ("long-range navigation") system developed in the 1940s. Once widely used in America, Japan and parts of Europe, Loran fell out of favour with the emergence of satellite-based systems. But its proponents have continued to develop the technology, and eLoran is now accurate to within 10 metres or so, which is comparable to GPS. "It is terrestrial as opposed to spaced-based, uses very high-powered signals rather than low-powered ones and it's very low frequency instead of high," says Sally Basker, president of the International Loran Association. "All of which means its failure mechanisms are different to GPS and other satellite-navigation systems."

Enthusiasm for eLoran is strongest in Britain, where the government awarded a 15-year contract in 2007 to develop eLoran for use by shipping in western Europe. A ministerial decision to move from the development to the operational phase is expected shortly. In the United States and Canada, however, Loran-C transmitters were switched off last year. After a long debate about the merits of keeping the system going, Barack Obama declared it outdated. The House of Representatives has given the Department of Homeland Security until April to decide whether a single, national GPS backup system is required. Which technology would be used to build such a system remains to be seen.

In a way, GPS has become a victim of its own success. Because it is used for such a wide range of civilian purposes, when somebody wishes to disable one GPS-based system, their actions can also disrupt other, unrelated systems. The benefits of satellite positioning are undeniable, and they are only likely to increase in future. But it is now clear that fully realising those benefits depends on putting systems in place to mitigate against deliberate and accidental interference, and to provide an independent backup that does not rely on the delicate trilling of distant satellites.

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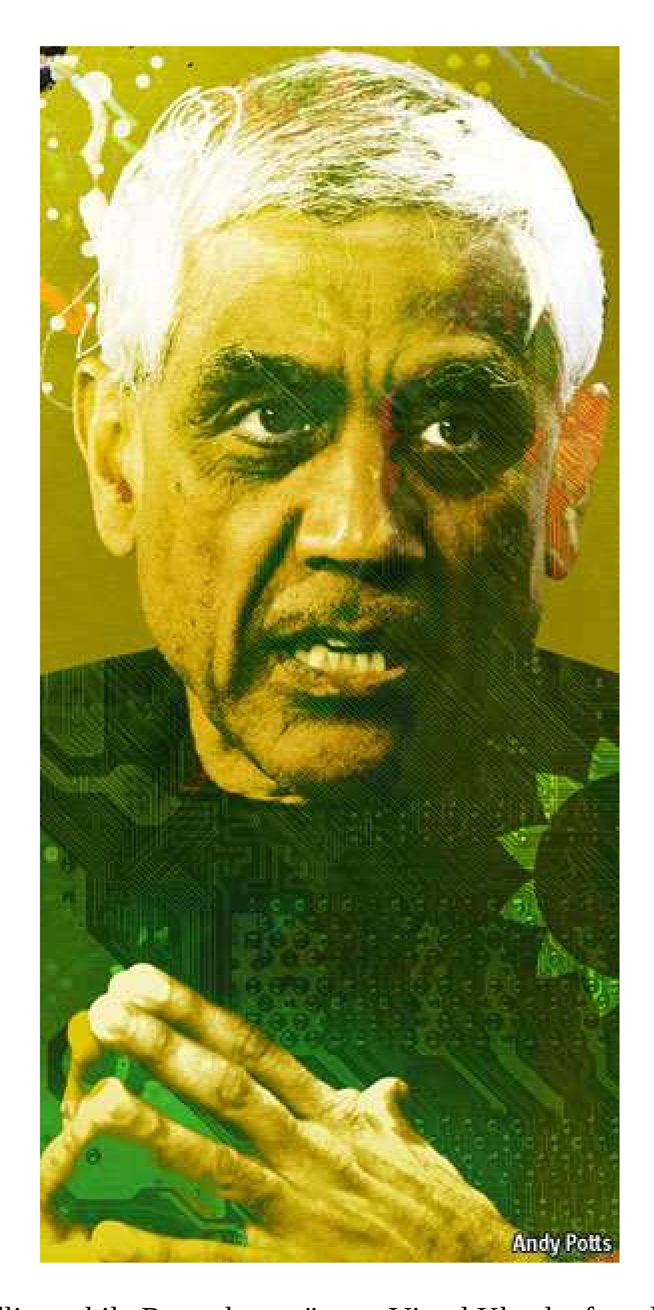
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Brain scan

# Betting on green

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**Vinod Khosla thinks most venture capitalists are being too cautious with their green investments. But is his own approach too risky?**




"ENVIRONMENTALISTS are fiddling while Rome burns," says Vinod Khosla, founder of Khosla Ventures, a Silicon Valley venture-capital firm. "They get in the way with silly stuff like asking people to walk more, drive less. That is an increment of 1-2% change. We need 1,000% change if billions of people in China and India are to enjoy a Western, energy-rich lifestyle." Forget today's green technologies like electric cars, wind turbines, solar cells and smart grids, in other words. None meets what Mr Khosla calls the "Chindia price"-the price at which people in China and India will buy them without a subsidy. "Everything's a toy until it reaches that point," he says.

Mr Khosla has a different plan to save the planet. He is investing over $1 billion of his clients' money in "black swans"-ideas with the potential for sudden jumps in technology that promise huge environmental benefits, easy scalability and rapid payback. The catch? Mr Khosla expects nine out of ten of his investments to fail.

"I am only interested in technologies that have a 90% chance of failure but, if they do succeed, would change the infrastructure of society in some radical way," he says. Khosla Ventures' portfolio reads like an eco-utopian wish-list: non-polluting nuclear reactors; diesel from microbes; carbon-negative cement; quantum batteries; and a system for extracting methane from coal while it is still underground.

"Any one of these things is improbable but, if you have enough shots on goal, then it's very likely that something improbable will win," he says. "Ten years ago, no analyst in the world would have predicted 650m cellphone subscribers in India but only 300m people with access to latrines and toilets. Even five years ago, no one would have predicted the way that Twitter took off. These are the black swan outliers." Mr Khosla is keen to point out that he has caught a black swan before. In the mid-1990s, when working for Kleiner Perkins Caufield & Byers, a venture-capital firm, he invested $3m in Juniper Networks, a company making telecoms gear based on internet standards.

"At the time, every major telecommunications company told us that they would never switch to internet systems," says Mr Khosla. Within just a few years, the internet boom had netted Kleiner Perkins a $7 billion return on its Juniper investment. Now Mr Khosla is gambling that venture capital can work similar magic in the field of clean technology. His approach is that of a pragmatic businessman rather than an eco-warrior. "I don't view climate change as a moral thing. I view it as a risk, no different from nuclear proliferation, terrorism or national defence," he says. "Business is used to buying insurance, and this is insurance that it is imperative we buy."

These high-tech insurance policies come in many flavours. Mr Khosla has invested in companies that promise ultra-efficient air conditioning using hypersonic vortices or desiccant chemicals. He is funding the commercialisation of low-power lighting, next-generation solar cells and super-strong building materials. But, like the environmentalists he scorns, Mr Khosla puts most of his energy into seeking alternatives to traditional fossil fuels.

"We remain primarily a gasoline-driven consumer economy," he says. "I'm happy to see the price of oil going up, as it will incentivise us to replace fossil fuels." Mr Khosla has invested in several biotechnology companies that aim to condense the multi-million-year process of creating oil from plant life into a matter of hours. Amyris, which was floated on the NASDAQ exchange last autumn, is using genetically engineered organisms to turn plant sugars into a precursor of diesel.

**Never tell me the odds**

Another start-up, KiOR, is hoping to go one step further, converting cellulosic biomass (such as waste wood and leaves) into a crude oil replacement called Re-Crude. Fans of cellulosic biofuels hope that they can produce ethanol without competing with food crops for agricultural land. According to Mr Khosla, KiOR can produce Re-Crude in America today for less than $90 a barrel. "Three years ago, I would have said that there was a 90% chance of KiOR failing. But these things aren't predictable. Forecasting is based on assumptions, and technology changes those assumptions," says Mr Khosla. "I never compute returns. If you start forecasting cash flows, you lose innovation, you lose instinct. You average yourself down to mediocrity."

No one is likely to accuse Mr Khosla of that. At the age of 20 he launched a soya-milk company in his home city of Delhi, targeting the multitudes in India who did not own a refrigerator. When it failed he moved to America to study biomedical engineering and business. In 1982 he co-founded Sun Microsystems, a maker of powerful workstation computers. After the company's initial public offering (IPO) in 1986, Mr Khosla left to become a venture capitalist. At Kleiner Perkins, Mr Khosla was involved in the early financing of Nexgen, an innovative chipmaker, and Excite, a search engine. He also had some high-profile flops, including Dynabook, a company that designed a tablet computer 20 years before the Apple iPad but proved unable to bring it to market.

"I've had many more failures than successes in my life," admits Mr Khosla. "My willingness to fail gives me the ability to succeed." His next move was characteristically unpredictable: he temporarily moved his family to India. "I wanted to see if I could have a social impact," he says. "I quickly realised that any non-profit activity I could do would be no more than a drop in the ocean. Most non-profit organisations are completely ineffective. That's when I decided that I needed to look for scalable solutions, which meant self-propagating solutions, which meant capitalist solutions. Proving the capitalist tool as a solution for poverty is high on my priority list."

Mr Khosla put several million dollars into SKS, a for-profit microfinance company. Although India's booming microfinance industry has since attracted criticism (and even government action) for its high interest rates and aggressive

debt-collection practices, Mr Khosla is adamant that its benefits outweigh any ills. "Millions of people now have access to financial services," he says. "That's more social than any non-profit thing I could have done. And guess what? In the process, I made $100m. You never know when something you're trying to be radical on will make you money."

If Mr Khosla is unapologetic about making money while helping some of the world's poorest people, he is equally outspoken when it comes to the environmental movement in the West. "Wind projects are a waste of time. And the reality is that electric cars today are coal-powered cars, because the USA and much of Europe have mostly coal-based electricity," he says. "Environmentalists use artificial rates of return, buried assumptions and 'what if' assumptions about behaviour changes. It's useless crap."

This sort of talk does not exactly endear Mr Khosla to environmentalists. "The solution to our energy problems is almost the exact opposite of what Khosla says," declares Joseph Romm, who is the editor of *Climate Progress*, an influential climate blog, and a senior fellow at the Centre for American Progress Action Fund, a think-tank. "Technology breakthroughs are unlikely to be the answer. Accelerated deployment of existing technologies will get you down the cost curve much more rapidly than a breakthrough."

But Mr Khosla is standing behind his black swans. "We fool ourselves into thinking that if 5% of San Franciscans or rich Germans can afford a technology, then it's getting market traction. But only when an electric car can compete with a Tata Nano will you achieve scale, and that requires radical innovations in battery technology," he says, referring to the world's cheapest production car. Accordingly, Khosla Ventures is funding several energy-storage systems, including high-efficiency solid-state batteries that sidestep the safety problems with today's lithium-ion cells.

It's all about diversification, says Mr Khosla: "We'll try half a dozen batteries. If other people try 30 more, only one has to work to completely change society." Whether other investors will be prepared to take similar gambles on blue-sky technologies remains to be seen.

**Going it alone**

Although Khosla Ventures' two funds are fully subscribed, and have invested about $1.3 billion in over 40 companies, billions more dollars and many more start-ups will be needed to hatch a flock of black swans. Mr Khosla estimates that the amount of investment required to replace all the petrol consumed in America with renewable fuels will run into the hundreds of billions of dollars. But other high-tech venture capitalists seem to be steering clear of risky green investments.

"I would love to say that Vinod is starting a trend," says Steve Westly, another venture capitalist focusing on green technology. "But no. Not everybody has the courage to do that. Even here in Silicon Valley, people find it hard to understand that if you think big, you're going to have some failures." Mr Khosla thinks other investors will come round to his way of thinking eventually. "The climate will change as soon as we have a Netscape moment. When we have an IPO where people see they can make a billion dollars, everyone will start to invest."

But Marc Andreessen, the co-founder of Netscape, whose IPO kicked off the internet boom, thinks Silicon Valley investors will prefer to stick to information technology. He has even promised that his latest venture-capital fund will avoid "clean, green, energy and electric cars". He argues that clean-tech is a very different field. "Moving from IT ventures to green technologies is nearly impossible, except for rare and extraordinary individuals like Vinod," he says. "He has put years into becoming a master of the field, but it's not the entire Valley deciding to move into clean-tech." Mr Khosla's mentor at Kleiner Perkins, John Doerr, has expressed concern over his own company's green investments and Peter Thiel, co-founder of PayPal and a partner at the Founders Fund, has said that clean-tech companies "for a variety of reasons don't work".

Facing both industry scepticism and the ire of environmentalists, Mr Khosla decided to engage Tony Blair, a former British prime minister, who joined Khosla Ventures last year as a senior adviser. The idea is that Mr Blair can provide a more diplomatic public face for the company, and he also brings global clout.

Mr Khosla, who clearly likes to see himself as a green iconoclast and financial maverick, is either very foolish or very clever. But at this point it is difficult to say which. "I try a lot of new things," he says. "It's fun to play the game and fun to play the odds-and long odds win a lot of fun." Mr Khosla's cold-blooded view of the economics of environmentalism has certainly ruffled some feathers. But if he turns out to be right, his quest for clean-tech black swans could be exactly what the planet needs.

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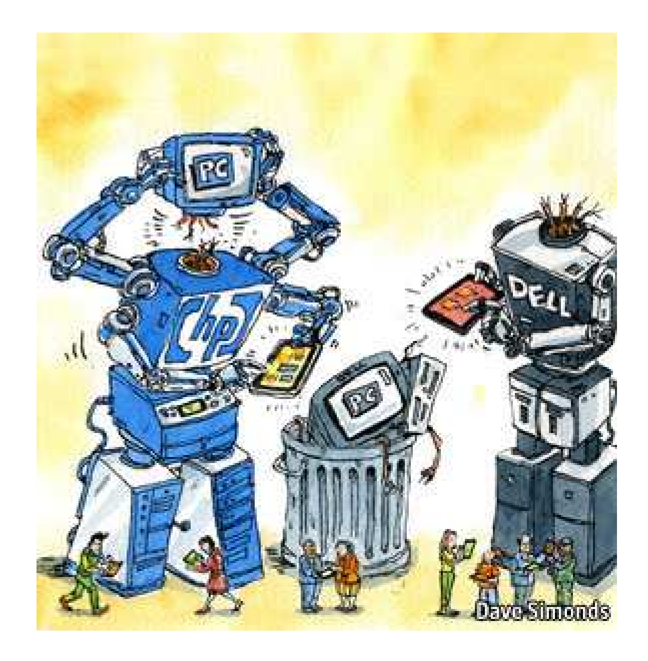
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Dell and Hewlett-Packard

## Rebooting their systems

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**Two computer giants prepare for a world no longer dominated by the PC**




ROUND ROCK in Texas and Palo Alto in California are half a continent apart, but Dell and Hewlett-Packard (HP), two tech behemoths that, respectively, have their headquarters in those cities, have much in common. The two personal-

computer makers boast impressive records as innovators-Dell in supply-chain management and HP in fundamental research-though each has lost some of its creative spark in recent years.

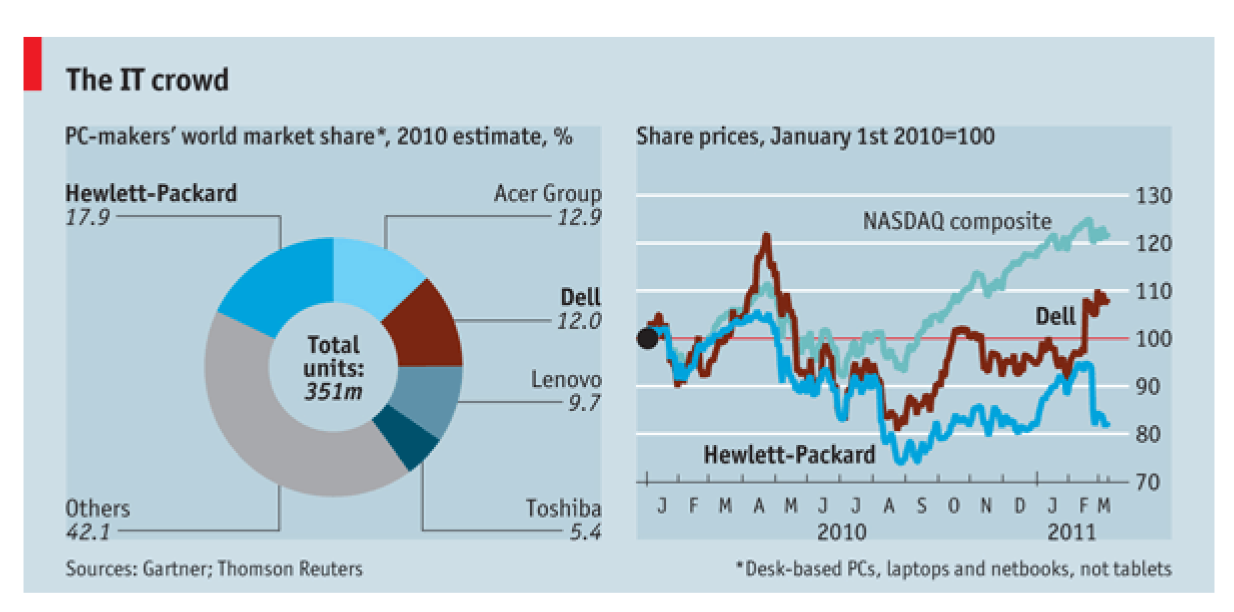
Both are battling to remain relevant in a rapidly changing information-technology landscape. Since Michael Dell returned in 2007 to the helm of the company he founded, he has overhauled its operations in a bid to revive its fortunes. Leo Apotheker, HP's boss since last year, is due to announce a new strategy for his company on March 14th. He has been hinting that he, too, will want to make significant changes at a firm that is still reeling from the traumatic departure of its previous boss, Mark Hurd, after a fuss over his relationship with a female marketing contractor.

Among the trends the two firms are grappling with is the growing popularity of tablet computers, smartphones and other devices that let consumers work and surf the web on the move. Apple's wildly popular iPad and other tablet offerings are starting to have an impact on low-end laptop sales. Gartner, a research firm, now reckons that global PC shipments will grow 10.5% this year, to 388m units, down from its previous forecast of almost 16%, partly because consumers are switching with such enthusiasm to tablets.

An even more important trend sweeping the industry is the growth of cloud computing. This lets companies store and process vast amounts of data in huge warehouses of servers run by third parties. The data can then be accessed over the internet whenever and wherever needed. New competitors such as Amazon and Rackspace Hosting have jumped into this market and are trying to persuade companies they would be better off renting capacity "in the cloud" than buying their own servers from the likes of Dell and HP. Of course, the cloud-services providers themselves buy lots of servers, mainly Dell and HP ones-but their huge size means they can drive a hard bargain on prices.

The emergence of the cloud is also partly responsible for a third trend, "verticalisation". This is the increasing tendency of makers of IT hardware, operating systems and applications to move into each other's area of business, because their corporate customers no longer want to shop around for all these different bits and splice them together themselves. They now want all-in-one solutions they can just take out of the box and switch on-and which are well integrated with their cloud-computing systems. Furthermore, for providers like Dell and HP, spreading vertically into other parts of the IT business also offers the best hope for growth in a market that is, overall, maturing.

This has created a free-for-all, with software firms swallowing up hardware firms and vice versa. HP and Dell now face stiff competition from the likes of Oracle, a software firm that bought Sun Microsystems, a hardware maker (Oracle hired Mr Hurd as its president after he left HP); and from Cisco, a maker of networking gear which has moved into the market for servers. This rapid restructuring of the industry is prompting the big IT firms to get out of low-margin businesses, as Japan's Hitachi did this week when it sold its disk-drive business to Western Digital for $4.3 billion.



HP and Dell dominate the PC business, together with Taiwan's Acer (see chart), so they are vulnerable to any shift away from such computers. Declarations of the death of the PC are premature, not least because demand from emerging markets is still growing. But Apple's stunning success with its iPad in rich countries, and corporate customers' demands for IT firms to provide a full service, not just bulk quantities of desktops and servers, mean that neither company can afford to be complacent. The PC is not dead, but its importance henceforth is going to be significantly diminished.

Dell is likely to fare a bit better than HP in this new world because its sales of PCs, which were 23% of the $16 billion of revenue it earned in its latest quarter, are more heavily geared towards companies, and they will probably keep buying desktops for some time to come. HP, which counted on PC sales for 32% of its $32 billion of revenue in its latest quarter, relies more heavily on purchases by consumers, whose heads are easily turned by new gadgets. However, both firms have plenty to worry about. "The computing market is fragmenting and devices are specialising," says George Shiffler of Gartner.

Dell's relative strength in the corporate market is becoming steadily less relevant, though. Companies are increasingly being swayed by what IT gear consumers (especially their own staff) are buying. So firms like HP and Dell need to come up with successful mass-market devices or risk seeing rivals' gadgets eat into their corporate sales. That is why they have recently unveiled tablets of their own. Dell's Streak 7 is based on Google's Android operating system, whereas HP's TouchPad runs on webOS, an operating system developed by Palm, a company that HP bought last year. In a recent Bloomberg interview Mr Apotheker said HP would start installing webOS in its PCs too, in addition to Windows, to create a broader platform for it.

This highlights a difference in philosophy between the two companies. Dell places huge emphasis on making products that are "open, capable and affordable". It is open to borrowing operating systems and other stuff from third parties and splicing them together itself. HP seems less willing-at least for now-to embrace such openness, preferring to use its in-house operating system. But if a successful ecosystem of "apps" evolves around Android, and tablets based on Google's operating system turn out to be as popular as Android-based smartphones, it may have to rethink its approach.

**Splashing out**

Although they are still paying plenty of attention to the PC and server markets, both Dell and HP have been working overtime to reduce their dependence on them-notably by splashing out on cloud-related businesses such as data-storage providers. In 2008 Dell paid $1.4 billion for EqualLogic, or more than ten times its target's revenues. EqualLogic is now on track to deliver $800m of annual revenue, justifying what appeared to be an extravagant purchase price. Last year, Dell added to its cloud capabilities when it bought Boomi, which helps move software applications to the cloud, and InSite One, which offers cloud-based medical archiving.

But Dell missed out on its most ambitious target last year when HP waltzed off with 3PAR, another data-storage firm, after a ferocious bid battle. HP paid $2.4 billion for the company, way above Dell's initial offer of $1.15 billion. After the dust had settled, Mr Dell claimed HP had overpaid for 3PAR, which had revenues of just $194m, whereas Dell had shown discipline. Yet Dell's final offer was a whopping $2.35 billion, only a smidgen below its rival's. The firm got a consolation prize in December, when it bought Compellent Technologies, another data-storage firm, for $960m.

**Battles ahead**

HP and Dell are destined to cross swords again as they go further down the verticalisation route and emulate IBM, a hardware maker which has built powerful software and services businesses with fat margins. Both firms have already made big acquisitions of service providers, with HP buying EDS in 2008 and, the next year, Dell buying Perot Systems (which, like EDS, was founded by Ross Perot, a former American presidential candidate). But they are bound to seek more such deals. Mr Apotheker, who used to run SAP, a German software giant, has made little secret of his desire to see HP expand in highly profitable software businesses. Last month HP bought Vertica, whose software helps firms analyse massive amounts of data fast, and there has been speculation that the company will consider more ambitious targets.

Dell's executives argue that the firm's diversification strategy is already bearing fruit. As evidence of this, Brian Gladden, its finance chief, points to the net profits of $927m it earned in the three months to late January, almost three times the figure a year earlier. Admittedly, Dell benefited from low component costs and an uptick in new PC purchases by companies following the economic crisis. But its results also reflect the growth of its services businesses, which have higher margins. These now account for 41% of the revenues of Dell's large-enterprise business, up from a third at the start of 2008.

HP's recent record has been less impressive, which is reflected in the relative performance of its shares (see right-hand chart, above). In particular, whereas Dell and other firms such as IBM and Accenture have seen an increase in service-related sales recently, HP's services revenue slipped 2% in its latest quarter. That partly reflects the fact that, although it is strong in outsourcing thanks to EDS, it does less well in higher-margin consulting-a weakness that Mr Apotheker ought to address.

HP's boss will also need to decide whether the computers-to-calculators company, which has $126 billion of annual revenues and 325,000 employees, can continue to dabble in so many areas. IBM, for instance, sold its PC business to Lenovo to focus on building its services activities. HP is unlikely to follow suit, considering that it is still the leader of the PC pack. Nor does it look set to jettison its printing business, which is having to adapt to an increasingly digital world. But if it is serious about beefing up its software and services activities, HP may have to make sacrifices elsewhere.

At the very least, Mr Apotheker will have to be clear when he speaks next week about the strategic logic that binds HP's disparate activities together. And he will need to emphasise that he is prepared to undo some of the savage cost-cutting undertaken during Mr Hurd's reign, which dented the company's innovation engine and sapped its morale.

HP has already started to reinvest in its services business and in January it brought in several new board members, including Shumeet Banerji, the boss of Booz & Company, a consulting firm, and Dominique Senequier, the chief executive of AXA Private Equity, whose experience will be invaluable as it mulls new investment. Mr Apotheker likes to joke that since moving to Palo Alto from Europe to run HP he has learnt how to say "awesome" and "cool" like a true Californian. Now his task is to persuade customers and investors to use those same words about HP.

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Electric cars

# Roll on the posh electrics

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**Even makers of the most expensive cars are switching to electric and hybrid power**



A battery under the bonnet

ROLLS-ROYCE'S silver Phantom on display at the Geneva Motor Show had a surprise under the bonnet. In place of a polished, gleaming cylinder-head there were batteries and electric motors to drive the 2.5 tonne aluminium giant. This was just a one-off "concept" car for a world tour to see what the super-rich think of having their everyday transport run on electricity rather than petrol. But less opulent examples of luxury cars going electric were also in evidence. Lexus (the luxury brand of Toyota) showed off seven petrol-electric hybrid models, while Land Rover, Porsche, Mercedes and BMW (the owner of Rolls-Royce) all had hybrids on show.

Until recently only Lexus among the premium brands seemed likely to follow its parent company, which has made more than 2m of its pioneering Prius hybrids since 1997. The Prius itself has evolved, and Toyota now offers an upmarket, seven-seater people-carrier version, with a lighter lithium-ion battery instead of the nickel-metal-hydride technology in earlier models. In Europe one in five Toyota and Lexus cars sold will soon be hybrids, and the Prius is already the company's best-selling model in Japan.

But now Toyota and Lexus hybrids are being joined by other, posher cars, as manufacturers feel the noose tightening on their tailpipes. "Society and governments want to move towards zero emissions from cars," says Ian Robertson, marketing director of BMW. The enthusiasm of Japanese customers for hybrids is also spurring on the Europeans.

BMW's electric cars are confined to its new I sub-brand for the moment, but a hybrid BMW 5 series and a 3 series will come to market this year and next. BMW's I-models tuck away their batteries and electric motors under the floor, leaving plenty of room for passengers and luggage.

Carl-Peter Forster, chief executive of Tata Motors, which owns the upmarket Jaguar and Land Rover brands, reckons that within ten years up to 80% of premium cars will be powered by hybrid engines. Over the past ten years such cars had largely switched from petrol to diesel for better fuel economy and lower taxes.

Volume-car companies are all bringing pure electric vehicles to market, but the batteries needed to power a big limousine would be too heavy. So hybrids are the obvious answer, according to Mr Forster. Even so, an all-battery Roller may yet cruise the highways, given advances in technology spurred by the electric enthusiasm of the car industry. "We'll see batteries advance more in five years than they have in the last 100 years," predicts Mr Robertson. BMW can make such a prediction confidently because of the progress it sees in universities, research centres and some start-up companies.

Petrol-electric hybrids are not the only alternative to all-battery cars. At the Frankfurt motor show in September, alongside hybrid versions of its largest cars, Daimler will show off versions of its Mercedes A-class and B-class models that can be powered by battery, petrol-electric hybrid or fuel-cell hybrid. Daimler's director of research and development, Thomas Weber, says the company has succeeded in bringing down the price of fuel-cell systems (which run on hydrogen) ready for mass production whenever Germany or maybe California starts building the world's first network of hydrogen filling stations.

Three fuel-cell cars are on a world tour to drum up support for such infrastructure, which Mr Weber argues costs no more than a network of charging stations. Batteries and petrol-hybrids are centre-stage for now but fuel-cell vehicles, which look like being the best for long journeys, still have the capacity to be strong contenders, for cheaper cars as well as fancy ones.

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The Renault "spying" affair

# A new twist

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**Doubts over the supposed foreign espionage at the French carmaker**

IN JANUARY Renault, a carmaker in which the French government owns a 15% stake, fired three executives for allegedly selling secrets about its electric cars, after an internal investigation sparked by an anonymous letter. It emerged that a Chinese company was suspected. The executives protested their innocence and sued for defamation.

China's government denied any spying by its companies. Renault hired private detectives to look for secret bank accounts abroad. Carlos Ghosn, who is chief executive of Renault and its associate company, Nissan, said on French television that it was not technical but business secrets that seemed to have been sold. A government minister talked portentously about economic warfare.

Two months on, however, the affair looks very different.

The motives for any spying had seemed clear: Mr Ghosn is largely betting the future of both his companies on electric cars, with a euro4 billion ($5.6 billion) investment to bring four Renault electric models to market to join the Nissan Leaf, which is already on sale. He wants Renault to make 500,000 electric cars a year by 2015: at this rate he thinks they will be profitable. A big challenge is getting the cost of their battery capacity below $400 per kilowatt-hour. Renault is said to be ahead of rivals in this regard and details of its numbers would reveal much about its competitive position.

However, Renault's chief operating officer, Patrick Pelata, now says there are doubts about the whole matter. He suggests that the spying accusations may have been part of an elaborate fraud against the firm.

The most senior of the three sacked men, Michel Balthazard, was on the management committee of the company and well known to both Mr Ghosn and Mr Pelata. This week Mr Balthazard gave an interview to *Le Figaro*, a daily newspaper, describing how he was hustled off the premises without any explanation or evidence to back up the bald accusations that he and his colleagues faced.

Despite this Mr Balthazard said he did not want heads to roll at the top of the company. Nor did he want in any way to destabilise Renault, for which he had worked for over 30 years. What he really wanted was for Mr Ghosn simply to go on television and admit that Renault had made a mistake.

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Fashion for the masses

# Global stretch

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**When will Zara hit its limits?**




One size doesn't fit all

IN GALICIA, not far from the Tower of Hercules which guards the rocky Atlantic coast, sits one of the world's most successful logistics operations. Small items whizz round a two-kilometre carousel and shoot into cardboard boxes. Bigger ones sway by on overhead rails. Lorries come and go like honeybees, taking the goods to far-flung parts of Europe or to airports near Madrid and Zaragoza for freighting to China or Brazil. These are not shipments of medicines or emergency rations, but speed is just as vital: the goods are clothes of the latest fashion, in hot demand everywhere.

Welcome to the world of Zara, purveyor of mass fashion. Amancio Ortega began making clothes in a rented garage in 1963. Now Zara's parent, Inditex, a listed company Mr Ortega still 59% owns, has more than 5,000 stores in 77 countries. It is still growing apace, especially in China, where it will open 80 more stores this year.

The secret of Zara's success is its speed-four weeks for a new fashion idea to hit the shops-and the feedback that store managers send to head office, to help it fine-tune its ideas. There is also firm control from Spain, the sole logistics hub. Although 34% of Inditex's manufacturing is outsourced to Asia, and 14% to parts of Europe including Turkey, those tend to be the more basic items. The high-fashion stuff, 49% of what it sells, is cut and finished in Spain though some sewing is done elsewhere.

Few rivals come close. Hennes & Mauritz (H&M) of Sweden is nearest. It is not as fast to market with new styles-months rather than weeks. But where it has caught on, especially in Germany, the Netherlands and Austria, its market penetration is higher. It has distribution centres dotted around Europe. Some 65% of its product is made in lower-cost countries in Asia. That means its cost base is lower than Inditex's, but it is more vulnerable to disruptions.

H&M was late into Asia, which still provides only 3% of revenues. Its January like-for-like sales were up only 1% on January 2010. Inditex, which reports annual results on March 23rd, will probably have done better. A big question, however, is how far it can go on growing from its home base. Now that 15% of its sales are in Asia, does it make sense to run product design and logistics just from Spain? Some clothes it has made in China are shipped to Spain and then back to shops in China. The chief executive, Pablo Isla, sees no need for a second product base: "We're not thinking of replicating the brain in Asia," he says, "though maybe logistics."

Another question is how long Zara can go on charging such markedly varying prices in different countries. Japanese customers pay about half as much again as west Europeans. Luca Solca of Sanford Bernstein, a research firm, says consumers in China, where Zara also charges more, see high prices as part of a product's appeal. But what will happen as Zara expands its online catalogue? H&M, which is further ahead in this, seems to be maintaining its big regional markups. Mr Solca says the 60% price differences Zara maintains between some countries are unsustainable-but 30% may be quite possible.

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Italian businesses

# Keeping it in the family

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**The Bulgaris sell up. Other Italian family firms are still holding tight**

THIS week’s news of a €4.3 billion ($6 billion) takeover of Bulgari, a jeweller, by LVMH, a French luxury-goods giant, was a relatively rare example of one of Italy’s many big, successful family firms selling out. The Bulgaris will get €1.9 billion in LVMH shares for their controlling 50.4% stake in the business, which is run by a great-grandson of the Greek craftsman who founded it in Rome in 1884.

The Bulgari deal leaves most of Italy’s medium-large firms still owned and managed by families: the list runs from Alessi (homeware) to Zegna (fashion) via Barilla (pasta), Ferrero (chocolates), Lavazza (coffee), Ferragamo (leather goods) and many more. Brands like these have flourished despite Italy’s red tape, shaky public services, creaking infrastructure and dodgy politics. For Emma Marcegaglia, president of the national employers’ association, and managing director of her

own family's steel business, such firms succeed because of their owners' flexibility, quick decisions and willingness to plan and invest for the long term, even in bad times. This also wins loyalty from employees.

Like Marcegaglia, founded by Ms Marcegaglia's father in 1959, many of the big family firms were born during Italy's economic miracle of the 1950s and 1960s. They have been tempered by the recessions, oil shocks and currency turmoil that followed. Now, as they struggle with weak demand, and strong competition from abroad, the firms face threats within.

Who should take the reins and when are tricky questions for family owners. Waiting is hard for youngsters, often more educated and better equipped for modern business than their fathers and grandfathers. "They cannot let go," complains Paola Carniglia, an executive of OTIM, a freight forwarder her grandfather set up in 1948. In her mid-30s and educated at Milan's main business university, she says her 70-year-old father scribbles budgets on envelopes, does not delegate and fails to understand that freight forwarding today requires new skills. "But he wouldn't be content as a full-time grandfather."

An obvious solution to some succession problems is to bring in professional, non-family managers. Although not an issue at OTIM, such ideas make Ms Carniglia nervous: she fears allowing such hired hands to become indispensable. The failure of many family bosses to play a team game—perhaps not surprising in a country where *prima donna* is a compliment, not an insult—can make things impossible for outside managers. "Lack of trust by families, reluctance to give responsibility to managers from outside the family and preference for incompetent nephews and nieces means that the experiment often fails," observes John Andrew, chairman of Eidos Partners, a Milanese investment bank. As a result, a lot of managerial talent emigrates. "Why be a honcho for Rossi and Son?" Mr Andrew asks.

Such individualism and diffidence towards outsiders hinders co-operation and consolidation. Bulgari had sought local partners to create an Italian luxury group to take on French giants like LVMH and PPR but encountered indifference. The result, as Ms Marcegaglia admits, is that: "Firms are undercapitalised and families' determination to keep control is a limitation." The Bulgaris concluded that selling out was the best option; other big business families seem more likely to keep control until circumstances force a rethink.

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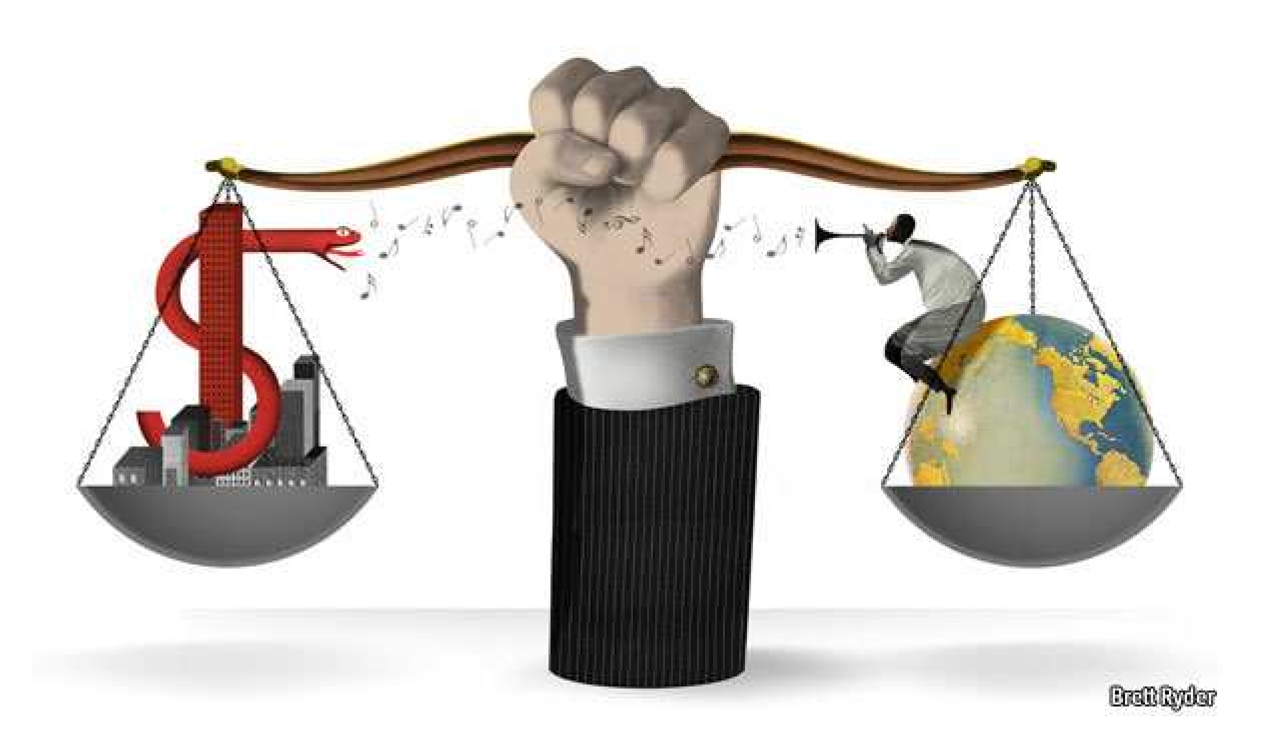
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Schumpeter

# Oh, Mr Porter

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**The new big idea from business's greatest living guru seems a bit undercooked**




HE HAS been one of the world's leading business thinkers for three decades. His work on strategy forms the foundation-stone of business-school courses the world over. Business titans and prime ministers beat a path to his door. In so far as there is an official line in the managerial world, Michael Porter lays it down. Mr Porter's recent books are as chunky as his earlier ones: his 2006 tome on health-care reform might have been more influential had it made more concessions to the reader. His students smirk at his arriving for classes with an entourage of flunkies. But most regard his lessons as high-points of their time at Harvard.

Yet Mr Porter has not had the equivalent of a number-one hit since "The Competitive Advantage of Nations" 20 years ago. He is also discovering that there is a downside to hobnobbing with the world's most powerful people. Like Tony Blair, Britain's former prime minister, and Howard Davies, who resigned last week as director of the London School of Economics, he helped to engineer the rapprochement between the West and Libya's murderous Qaddafi regime. Mr Porter's boasts about his dinners with Saif al-Islam Qaddafi now seem deeply embarrassing.

So for the sake of Mr Porter's brand a good deal depends on the reception of his latest big idea. He claims to have found nothing less than a formula for reinventing capitalism: "shared value". Old-fashioned capitalists focus too narrowly on profits, he argues. Newfangled corporate social responsibility (CSR) types are bewitched by the idea that there is a tension between business and society. But shared value offers companies a way to pursue their self-interest while also acting in the common good. It will unleash a cascade of innovation and productivity gains. And provide capitalism with the popular legitimacy it clearly needs.

What does this mean in practice? Mr Porter focuses on three things. First, the need to create market "ecosystems", especially when selling to the poorest in developing countries; this may require firms to make partnerships with NGOs and governments. Second, expanding their value chains to include such unconventional partners. And third, creating new industrial clusters.

Some of the examples Mr Porter provides are already familiar. GE's "ecomagination" strategy of creating environmentally friendly products is said to be responsible for $18 billion in annual revenues. Walmart has saved a fortune by reducing wasteful packaging. IBM and Intel are helping utilities cut power use. Five per cent of Unilever's sales in India now come from an army of underprivileged women entrepreneurs. Some are less well-known, such as a scheme to support small cocoa farmers in Cote d'Ivoire, which raised their incomes by over 300% by improving yields, product quality and procurement.

Opinion is divided on Mr Porter's big new idea. He thinks "shared value" may have at least as big an impact as his earlier work. Many corporate titans echo his sentiments. The bosses of PepsiCo, Nestle, Prudential (of Britain) and Petrobras expressed enthusiasm about his arguments at the recent Davos summit. However, Larry Summers, a former American Treasury secretary and a colleague of Mr Porter's at Harvard, was overheard asking "Do you seriously believe this [expletive unrecorded]?"

Mr Porter is right to worry that capitalism is suffering a crisis of legitimacy. The 2007-08 global economic panic has generated widespread worries that the capitalist system is too short-term and too crisis-prone. He is also right that CSR-the boardroom's favourite response to this crisis of legitimacy-is a tired label. Two of its loudest corporate proponents, Enron and BP, messed up dramatically. Few people outside the public-relations industry can listen to the CSR mantras of "win-win" and "doing well by doing good" without grimacing.

Mr Porter's examples suggest he is mostly concerned with encouraging companies to be less short-termist: he thinks they should understand better that environmental damage harms the bottom line too, so it is in their direct interest to curb it; and firms selling in the emerging world must do more to help consumer markets develop. But none of this is new: efforts have been made for years to get companies to see the full benefits of cutting pollution, while emerging-world giants like Hindustan Unilever and Tata are well aware that they are in the business of creating and shaping markets. There is a striking similarity between shared value and Jed Emerson's concept of blended value, in which firms seek simultaneously to pursue profit and social and environmental targets. There is also an overlap with Stuart Hart's 2005 book, "Capitalism at the Crossroads".

**Is there no alternative?**

Worse, it is not clear that Mr Porter has come up with any tangible improvement on the current way of doing business. Is it true that shared value will "drive the next wave of innovation and productivity growth in the global economy", or merely a pious hope? For all we know the next such wave may come from energy-hungry, socially divisive businesses, given the paucity of evidence Mr Porter offers to support his thesis. His arguments have some common flaws: he persistently plays down the difficult trade-offs that businesses often have to make, even in ventures with clear potential for social good (eg, advising a ravaged country on how to cut poverty, at the risk of bolstering its dictatorship). In arguing that "the purpose of the corporation must be redefined as creating shared value, not just profit per se," he risks giving politicians carte blanche to meddle in the private sector.

No one should underestimate Mr Porter's intellectual energy or ambition. He has colonised entire fields of business theory. He has published 18 books to date. But for "shared value" to have the same impact that his earlier output undoubtedly had, he will need to do a lot more work on the idea.

Economist.com/blogs/schumpeter

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Entrepreneurship in China

# Let a million flowers bloom

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**China is often held up as an object lesson in state-directed capitalism. Yet its economic dynamism owes much to those outside the government's embrace**




IT IS Sunday January 2nd, a national holiday, in a medium-sized Chinese city, just north of the Taiwan Strait. The temperature is well below freezing. There is no heating in the factory, which makes components for electrical tools. This probably reflects frugality rather than a ban, imposed by Mao Zedong, covering every building south of the Yangzi river. A thin haze of winter light comes through the windows. The only other sources of illumination are flickering cathode-ray computer terminals, which make silhouettes of the heavily clad workers sitting at them.

Down the corridor, in a huge office even colder than the main floor, the company's president sits at the head of a low table surrounded by friends. His hands are too busy to shiver, plucking tiny cups out of boiling water and making tea with a jumble of strainers and clay kettles. The cups are passed around, returned, and passed again, providing little jolts of warmth.

The friend to his left has his own company, also making tools: the two of them are links in China's vast, fast-expanding production line. Another man, possibly an official, is just leaving, having concluded discussions about a new factory. A fourth, who runs a private investment firm, explains why work goes on even during a holiday by citing the title of an American film: "Money Never Sleeps."

Each of the three businessmen at the table grew up in families which struggled even to afford food; each now owns at least four luxury cars. The results of similar stories can be seen outside other factories, where work also seems to be going on: in the car parks are BMWs, Jaguars, Land Rovers, Mercedes and Porsches. The prices of nearby flats equal those in the richest Western cities. And Chinese money is buying not only cars and property, but also the tractors and backhoes that are preparing the ground for a new lot of buildings.

**The twilight zone**

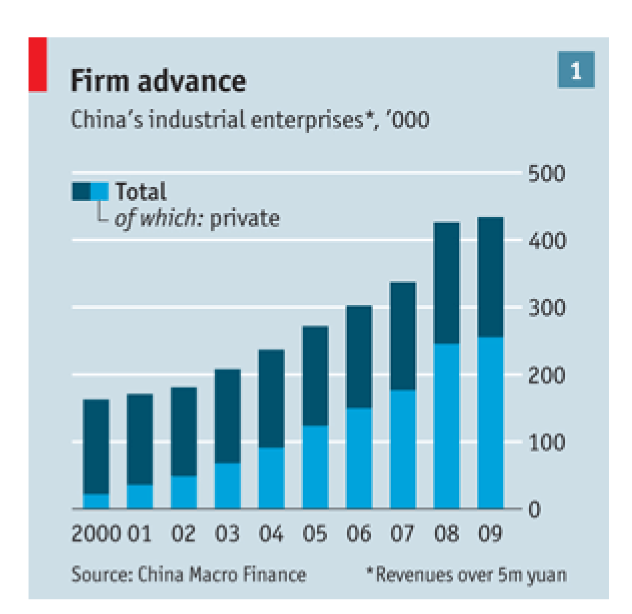
Luxury goods notwithstanding, wealth is created quietly in Zhejiang's cities and other places that not long ago were wretchedly poor. None of the people interviewed for this story wanted to be named. Their companies tend to be small and privately owned. They make ordinary (but increasingly good) products under their own names, or sophisticated ones under the strictest anonymity for well-known foreign companies which demand silence as a condition of doing business.

Of the foreigners' many demands, this is likely to be the most welcome. The right of China's private companies to exist is by no means clear. Private companies with more than eight employees began to emerge only in 1981 and were not officially sanctioned until 1988 (the number was drawn from an essay by Karl Marx on an inflection point for the creation

of a rentier class); and China has a brutal history of ideological retreats. Today's entrepreneur can become tomorrow's convict. Best, therefore, to avoid too much attention.

Not all China's private businessmen are as reticent as the quiet men of Zhejiang. A handful of private entrepreneurs, it is true, have won the backing of the state in the form of finance or legal forbearance-and with it a bit of fame. This reinforces the common belief that China's economic success is an object lesson in state capitalism. The government owns the biggest companies: as the economy grows at double-digit rates year after year, vast state-owned enterprises are climbing the world's league tables in every industry from oil to banking. Yet alongside the mighty state engine myriad smaller ones are whirring-and probably more efficiently.

China's state-controlled entities are not particularly profitable. A study by Qiao Liu, a professor at the University of Hong Kong, concludes that the average return on equity for companies wholly or partly owned by the state is barely 4%, despite the benefit of cheap leverage provided by government-controlled banks. According to a recently published paper by Mr Liu and a colleague, Alan Siu, the returns of unlisted private firms are no less than ten percentage points higher.




Another sign of the economic energy of the private sector can be found in its rate of growth. According to China Macro Finance, a research firm in New York, the number of registered private businesses grew by more than 30% a year between 2000 and 2009 (see chart 1). The gross figure (ie, before netting off firms that closed) was at least seven percentage points higher, estimates Ronald Schramm, China Macro Finance's managing director.

These figures exclude unregistered businesses, among them the country's ubiquitous tiny offices and manufacturers. Millions of people trade through electronic platforms like Taobao, which is intended as a site for individuals but has listings for transactions involving volumes that could not possibly be for personal consumption. At a conference in November Zheng Yumin, the Communist Party secretary for Zhejiang's commerce department, said that there were 43m companies in China, 93% of them private, employing 92% of the country's workers.




No one knows quite how much private companies contribute to China's fast-growing economy. Chinese firms fall into a bewildering variety of legal categories and their respective contributions to GDP are not reported in official statistics. However, enterprises that are not majority-owned by the state account for two-thirds of industrial output, according to the latest figures from the National Bureau of Statistics. And according to Eva Yi of Keywise Capital Management, a hedge fund, such firms account for about 75-80% of profit in Chinese industry (see chart 2) and 90% in non-financial services. Jun Yeop Lee of Inha University, in South Korea, calculates that enterprises not majority-owned by the state contribute about 70% of GDP, assuming that they account for all agricultural output and two-thirds of services.

The significance of the private sector, though, lies in its vibrancy rather than in precise measures. For a state-directed country, much of China's success comes from businesses that thrive in large part because they operate outside state control.

**From nothing**

It is commonly said that Zhejiang's greatest contribution to its citizens-and ultimately to China's economic resurgence-was to provide them with nothing and to cut them off from outside help. The province's topography comprises mostly mountains and rivers. Until fast trains, highways and airports were built over the past 15 years, access was poor from everywhere except Taiwan. That made it, viewed from Beijing, the wrong place for public investment. As a result, what business did exist was largely private, and meagre in the extreme.

Zhejiang's first successes came in the collection and recycling of four unlikely commodities, says Raymond Ma, who grew up in Wenzhou, the province's best-known city, and now heads China research for Fidelity, an international fund-management company. These were used packaging, plucked chicken feathers, tattered cotton and spent toothpaste tubes. The cotton, for example, would be picked apart and "refreshed" into new garments. This trade eventually spread beyond the province's borders and laid the foundations for other, more dynamic businesses. Governors sent from Beijing would invariably begin by attempting to impose state control, but gradually accepted private enterprise as the only way to eke out growth.

As China came out of its Maoist gloom, Zhejiang's scrappy entrepreneurs had already acquired, in the least auspicious circumstances, a culture of opportunity and a belief that anyone could become successful. These would prove to be extremely useful assets.

The anecdotes are almost endless. A Wenzhou businessman who is now ensconced in an office with an elegant address (but no heating) in Shanghai dropped out of high school in the 1980s. A relative lent him 30 yuan (then less than $10) which he paid to an agent for a job in a shoe factory at less than 300 yuan a month. From shoes he went on to electronics,

from electronics to selling building materials, from selling building materials to manufacturing them. Today he employs 1,300 people.

Another native of Wenzhou, also now in Shanghai (but who chose to meet in a heated coffee shop), left school at 16 and borrowed 360 yuan. That bought two noodle-making machines and a ticket for a 30-hour rail journey to a remote area of China, rumoured to be untapped territory. He sold the machines for 480 yuan. More orders followed. The business grew for six months, and then competition entered: it was time to start again. Selling buttons came next; then trading in scrap that could be used to make them; then factories to produce plastics for buttonmaking (and later for watchmaking). Now he is searching the world for machinery to create the high-grade plastics used in LED screens.

The focus on business often came at a high personal cost. A woman who began as a primary-school teacher in Wenzhou on 30 yuan a month moved to a slightly better-paid job in a textile factory. She then became a printer, clothing exporter, property developer and, most recently, wine importer. She is by any measure a tycoon. Along the way she sent her children to Europe when the elder one was ten, to live with a sister who handles overseas sales. The means to support them were in China; their lives would be better in France.

China's entrepreneurs were quick to shift into exports. State-approved trade fairs, notably one in Guangzhou, used to be rare opportunities to meet foreign customers. Now there are many more chances. In 1982 Yiwu, a city on Zhejiang's northern border, opened a permanent trade centre that in the past dozen years has become popular with foreign buyers. It is one of the largest indoor markets in the world, claiming 140,000 outlets. They line the sides of narrow corridors, their doorways overflowing with bales of wire, crockery, wrenches, lights, cutlery, pens, toys, tools, ornaments for the world's holidaymakers and even newly manufactured Middle Eastern "antiques". Across the street are *halal* restaurants for the many Arab customers.

**A family multinational**

The foreigners in Yiwu come to buy; increasingly, the Chinese are going abroad to sell. At the forefront are families like Natasha's. Natasha lives in southern China with her child and husband, a petroleum engineer. Her sister graduated from a Chinese university and found herself, like many students, jobless but ambitious.



Souvenirs of somewhere else

In 2004 a Yiwu-like market was opening in Dubai. With Natasha's help the sister found on the internet a local marble producer, with an annual turnover of 1m yuan, who wanted a Dubai representative. Off the sister went; a younger sister followed later. The family outlet in Dubai added a finishing factory and Natasha's sisters donned headscarves and whatever other conservative garments were required to make sales calls to Iran, Lebanon, Syria and elsewhere. Recently, in response to clients' requests, marble slabs from Italy have been added to the product line. Another client needed bathrooms and kitchens, 200 units at a time: sourcing those in China became Natasha's job. Turnover for the Dubai office rose above 100m yuan, fell by half during the financial crisis but then rebounded to a higher level. Within seven years, therefore, a few young Chinese women have created a small, diversified, multinational company.

They would not consider themselves unusual. There are now more than 4,000 Chinese enterprises selling through the Dubai Dragon Mart; many of them have expanded their operations to Africa and Latin America.

**The capital mystery**

Like any growing venture, China's private businesses need capital, and in much bigger amounts than 30 yuan for a job agent or 360 yuan for a couple of noodle machines. Its sources are a bit of a mystery: largely unofficial, even secretive. Very little seems to come from the big, state-owned banks, although China's government has made increasingly loud noises about small firms' need for finance. Loans to small and medium-sized enterprises comprise 4% or less of the total made by three of the country's four largest banks, according to company reports.

A few other smaller institutions have begun to emerge. Zhejiang Tailong Commercial Bank, a privately owned lender, has grown at a rate of more than 40% a year making smallish loans (averaging 500,000 yuan, or $76,000). It has imbibed the same entrepreneurial spirit as its clientele, employing workers in two shifts to maintain office hours of 7.30am to 7.30pm, seven days a week. But it is an exception.

That leaves a huge gap, which has been filled by an unofficial system that is discerning, vibrant and (depending on the authorities' sentiment of the moment) even illegal. According to research by China's central bank cited by *China Daily,* a state-run, English language newspaper, 89% of Wenzhou's population and 57% of its enterprises have borrowed outside the banking system, paying interest rates of 10% for 30 days or 214% for a year. (Established businesses say rates of 1.5-2% a month are common.) Although the scope of this form of finance is not known, a Wenzhou businessman reckons that there are 100,000 people in his city who could each raise up to 1 billion yuan within 48 hours. So liquid is the system that, unlike private-equity groups in the West, Chinese partnerships often do not raise money before seeking prospective investments; investments are found and then partnerships are formed in short order.

A Westerner with family ties in Fujian province, to the south of Zhejiang, says he is constantly presented with opportunities. He rejects many of them, most recently one in importing second-hand women's handbags (because criminals may have been involved) and another in exporting hair extensions to Japan (too complicated), but he has embraced others, notably in coal (which doubled his money in a year). The system is entirely informal. Records, he says, are minimal and all investments are in cash. A by-product is a proliferation of vast steel safes in homes and offices.

This freedom from financial bureaucracy should not be underestimated. Transactions can unfold at breathtaking speed. Within three months, this Westerner said, his relatives had been involved in the purchase of one steel mill and, in a separate deal, the sale of another. Businesses can be created or liquidated overnight. Rather than pay taxes, he adds, many companies make nominal payments to the local government. This is particularly true of Chinese based abroad, who move quickly from one country to another as opportunities, often tied to Chinese exports, arise.

Nevertheless, this form of business has inherent limits. To the extent that firms operate outside the law, they are vulnerable to shakedowns from local officials and mood-swings in Beijing. Although success brings praise, too much of it can invite envy and scrutiny. Each new list compiled of China's greatest tycoons is often accompanied by stories about those on earlier lists who later fell foul of the law. In his remarks last year Mr Zheng, the provincial party official, said that the significance of private business was not understood: businessmen were often criticised (perhaps a veiled reference to being jailed) without good reason and if continually squeezed, would emigrate, sapping China's vitality. The prospect of expropriation undermines the willingness of these entrepreneurs to make the long-term investment needed to develop brands, novel products and capable middle-management.

One method used to bring private companies into the mainstream appears to be the sale of shares in a public offering. In the West, offerings of shares on a stock exchange are used to raise capital, to provide cash to the initial investors, to create a currency to buy other companies and perhaps to provide independent valuations and external discipline. All this may be true in China too. But share offerings play another essential role: they legitimise a company.

Before an offering, it is not uncommon for a company to fail on any number of legal standards. It may not have full title to the land on which its factories sit. It has almost certainly avoided taxes. The process begins with bringing accounts into conventional forms, repaying taxes or paying for the land. The money for this, says an experienced banker, often comes from a "pre-IPO" offering to a small group of investors. These are perceived to be hugely lucrative to financial institutions, but vital to issuers. The resulting company is then deemed clean enough to pass a rigorous government inspection. Share sales usually happen only once: secondary offers, though common in other countries, are rare.

According to Mr Liu and Mr Siu, listed private companies continue to be more profitable than listed state-owned enterprises. However, their returns on equity are nothing like as good as those of unlisted private firms. This not only underscores the importance of China's upstart businessmen, but also raises questions about how Chinese enterprise will evolve. It is possible that returns dip simply because companies use share issues to load up on capital, and hence overcapitalise themselves and depress returns on equity, at least in the short term. It is also possible that they go public only when their best days are past. Another, more pessimistic, possibility is that as the Chinese private sector grows, comes under scrutiny and adopts commonly accepted structures, its vitality will diminish.

It is often said in China that a new economic era has recently begun, described as *guo jin min tui*: state advances, private retreats. The government has reasons for such a change: it is tightening laws, building infrastructure and providing strategic guidance it considers necessary for the country's next steps. Many in the West applaud the expansion of the government's sway, believing in the wisdom of the state in pushing China's economy forward. But behind China's remarkable success has been an odd and often unappreciated experiment in laissez-faire capitalism.

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Regional inequality

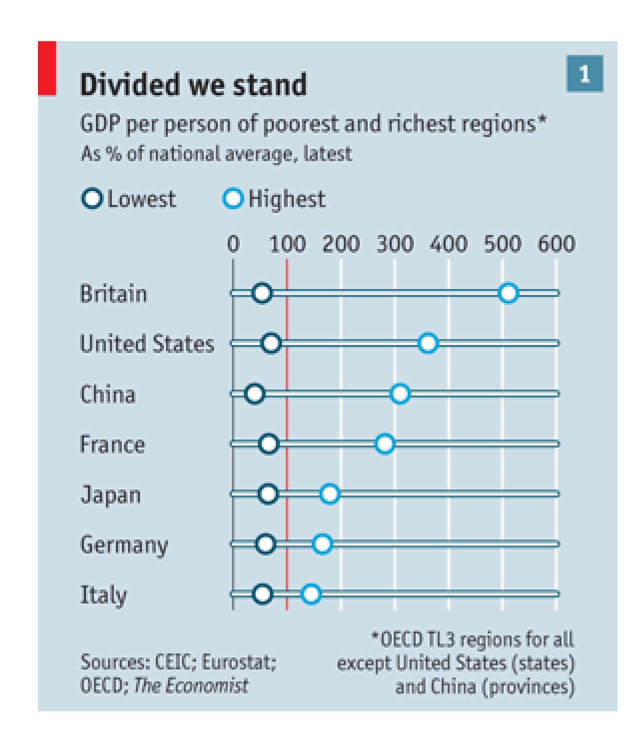
## Internal affairs

**The gap between many rich and poor regions widened because of the recession**



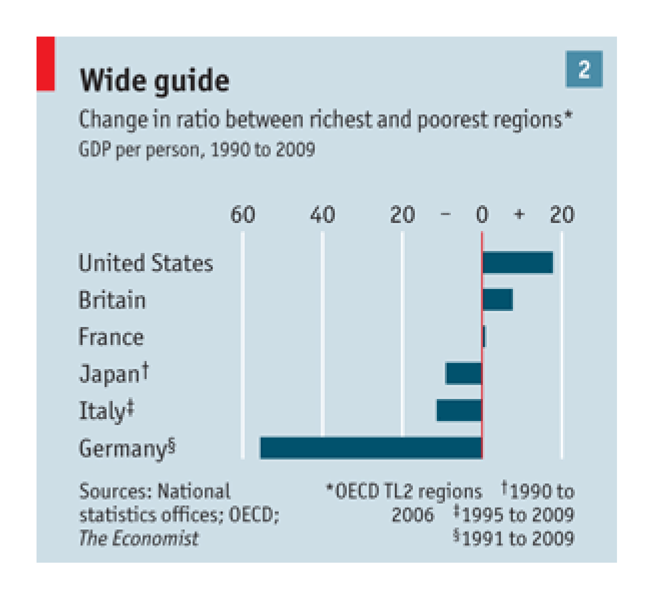

THE differences between countries are often not as great as the disparities within them: each nation is divided by a common economy. An analysis by *The Economist* suggests that the gap between poorer and richer regions increased during the downturn in some developed economies. And the income gap between richer and poorer areas is likely to widen further as government-spending cuts disproportionately hurt less prosperous parts.

Regional data come with various health warnings attached. Comparing regions in different countries is tricky, because their size varies hugely. We mainly use the OECD definition of "small areas" (Britain is broken into more than 100 regions), except for America where data are available only on a state-by-state basis. Crude income numbers also ignore the fact that the cost of living is cheaper in rural parts than in big cities, which has the effect of exaggerating inequality. Urban areas are always likely to be wealthier than rural ones because of their higher productivity and their greater ability to attract companies and employees.




Still, the extent of regional income inequality is striking in many countries. Chart one compares the ratios of GDP per head in the poorest and richest regions relative to the national average (a method often used by the OECD). Britain has the widest disparities, with average GDP per head in central London more than nine times larger than in parts of Wales. Central London's income per head is inflated by commuters who work in the city but do not live there, but even adjusting for this Britain has a big regional spread. So does America: the District of Columbia is five times as rich as Mississippi. Italy and Germany have the smallest regional spread, yet incomes in their most affluent areas are still almost three times those of the poorest.

In several places regional disparities have worsened over time. Start with America. Between 2007 and 2009 real GDP per head in the five richest states actually rose by an average of 2%, but fell by 3% in the five poorest. Both groups outperformed the national average, a fall of more than 4%. (The biggest slumps, both by more than 10%, were in Michigan, the eighth-poorest state, and in Nevada, site of the biggest house-price crash.) But in general richer regions fared better.




That continues a longstanding trend. Since 1990 the ratio of GDP per head in the District of Columbia compared with that in Mississippi has risen by almost a fifth (see chart 2, which, America aside, looks at figures for bigger regions than chart 1 because the data are more timely). The change is less pronounced if you average GDP per head in the five richest and

five poorest states, but it still holds. That is largely due to the dependence of poorer states on manufacturing, which has suffered big job cuts over the past decade. In 2000 the share of manufacturing in GDP was three times bigger on average in the five poorest states than in the five richest.

Regional inequality has also widened in Britain. The ratio of GDP per head in the three richest regions to the three poorest increased by almost a tenth between 1990 and 2009. The recession exacerbated things. Real GDP per head fell by 6% during 2007-09 in poorer areas, such as Yorkshire, the Midlands and Northern Ireland, twice as much as in London. In France, too, the income gap has widened: during the recession real GDP per head fell by twice as much in the five poorest states as in the Ile-de-France region around Paris.

The story in Germany is rather different. GDP per head in Germany's five poorest states (all in the east) fell by slightly less during the downturn than in the five richest. This continues the dramatic convergence of the past two decades, thanks partly to huge national and European Union funds for infrastructure, R&D and education, as well as the transfer of some manufacturing jobs from factories in the western states to the east. In 1991, just after unification, Hamburg was five times richer than the poorest eastern region; now it is only 2.3 times richer. In Italy, too, the gap between Italy's wealthy north and the lagging Mezzogiorno in the south has also narrowed over time, thanks in part to large fiscal transfers.

National economic data have the effect of masking regional changes. But beneath the surface they can have striking consequences. At the same time as many poorer regions in the West have been lagging, China's most prosperous districts, Shanghai and Beijing, have been growing even faster than the economy as a whole. If GDP per head is converted into dollars using the IMF's national rates for purchasing-power parity (again remembering that national rates paper over differences in the cost of living between regions), over a quarter of regions in Britain and Italy and one-tenth of those in Germany will this year have a lower GDP per head than the municipality of Shanghai. All the American states remain richer, but Shanghai looks set to overtake Mississippi by 2015; within ten years half of all the states, including Florida, Michigan and Ohio, could have a GDP per head lower than Shanghai and Beijing.

How best to raise income levels in the poorest regions without just doling out money? Some argue that making labour markets more flexible, so that people can move in search of work, reduces the labour supply in areas of high unemployment. Joblessness can easily become entrenched. In Calabria in Italy, the unemployment rate has fallen sharply, from 26% in 2000 to 12% last year, but largely because the jobless have given up looking for work. Only about 40% of working-age people actually have jobs, compared with 65-70% in northern Italy.

But studies suggest that differences in productivity are far more important than differences in joblessness in explaining regional income gaps. This implies that governments also need to focus on improving education and skills in poorer areas. In Mississippi only 19% of those aged 25 or over have a degree, compared with 36% in Connecticut or 48% in the District of Columbia. Only 21% of working-age people in Sunderland, a city in the north-east of England, have any form of higher education, compared with 39% of Londoners.

Unfortunately, public funds will be tight over the next few years. Indeed, the gap between richer and poorer regions is likely to widen in many countries as the public-spending axe falls. Nowhere will this effect be more striking than in Britain. Cities in the north and Wales are much more dependent on public-sector jobs and welfare benefits than cities in the south. According to the Centre for Cities, a think-tank, welfare benefits account for 28% of residents' total income in Liverpool, compared with 14% in London. Almost 40% of Liverpool's jobs are in the public sector, compared with 22% in London.

In America, spending by state governments will be severely squeezed, too. Less spending on education or infrastructure will worsen regions' longer-term growth potential, reducing the capacity of poorer regions to catch up with their wealthier counterparts. Whether the bankers and policymakers behind the recession and the current fiscal hole will notice is unclear. Most live in more affluent areas.

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The Galleon trial

# Network effects

**A massive insider-trading trial shakes Wall Street**




Last days of the Raj?

"RAJ RAJARATNAM is not a master of the universe, but rather a master of the Rolodex." That is how Robert Khuzami, director of enforcement at the Securities and Exchange Commission (SEC), described the hedge-fund titan in October 2009 when he was arrested for insider trading. Mr Rajaratnam used to be considered one of Wall Street's cleverest investors. His hedge fund, Galleon Group, once managed $6.5 billion. But on March 9th, when the humbled Mr Rajaratnam showed up for the start of his trial, he didn't look much like a master of anything, save his six-person defence team.

Mr Rajaratnam is at the centre of one of the largest insider-trading cases in history. Government prosecutors allege that Mr Rajaratnam used his wide network of contacts, including executives at big companies like IBM and Intel, to track down non-public information which he then used for trades, raking in profits worth $45m. Many of his erstwhile friends and associates have already confessed to wrongdoing. Of the 26 people that the US Attorney's office has charged in connection with Galleon, 19 have pleaded guilty. Mr Rajaratnam insists he is innocent and traded only on the basis of public information.

The trial is expected to last ten weeks and could feature as many as 102 witnesses, including some of Wall Street's top brass. Lloyd Blankfein, the boss of Goldman Sachs, and David Viniar, the bank's chief financial officer, may testify. Rajat Gupta, a former boss of McKinsey whom the SEC charged on March 1st with providing tips to Mr Rajaratnam, may be summoned, too. It is not clear yet whether Mr Rajaratnam himself will take the stand. Federal prosecutors will play recordings of phone conversations during the trial, so his voice will be heard regardless.

A jury of 12 people will decide the fate of Mr Rajaratnam, who could spend up to 20 years in jail if he is convicted, according to some estimates. Given these high stakes, it is no surprise that selecting the dozen jurors was a painstaking process. Mr Rajaratnam's lawyers expressed concern that the SEC's charges against Mr Gupta could bias a jury. There is also the public's resentment of Wall Street. Richard Holwell, the judge trying the case, asked prospective jurors more than 50 questions to gauge their eligibility, including whether they were strongly biased against wealthy financiers who do million-dollar transactions. Two said they were, and were dismissed.

Mr Rajaratnam is not the only one who has a lot riding on the outcome of this case. After its failure to spot Bernie Madoff's Ponzi scheme, the SEC is under pressure to prove it has got tougher on rogue hedge funds. The Galleon affair may be about insider dealing but the government has adopted heavy-duty crime-fighting tactics including wiretapping and raids. If Mr Rajaratnam is acquitted, it will be a huge embarrassment for prosecutors.



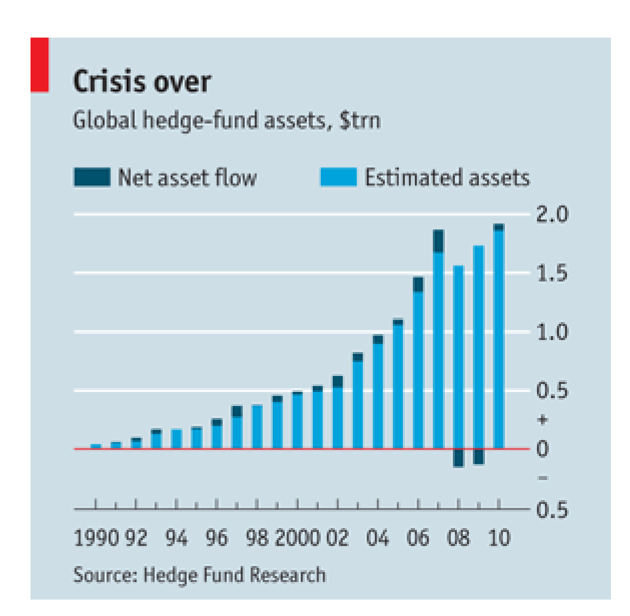

Others are also on edge. When the SEC first brought charges in the Galleon affair, Preet Bharara, the US attorney for the Southern District of New York, who is the lead prosecutor in Mr Rajaratnam's trial, said it should be a "wake-up call for Wall Street". Mr Bharara meant what he said. The SEC has been paying close attention to the use of "expert network" firms, which connect traders who want to know about a certain company or industry with consultants who can tell them about it. The firms are supposed to provide only details that are public, or can be found out legally ("market colour" is what people in the industry call it). But the SEC has raised concerns that employees at expert networks are going too far and sharing material, non-public information with those willing to pay for it.

Last November the agency charged a French doctor for allegedly tipping off a trader at a hedge fund about a death in a clinical drug trial. The doctor is thought to have served as a consultant at an expert network. Then, last month, the SEC charged ten people who were employees or clients of Primary Global, an expert network, with insider trading. Dozens of subpoenas have reportedly been sent out to other hedge funds, mutual funds, banks and expert networks to gather more information. More charges may soon follow.

The effect on parts of the hedge-fund industry has been chilling. So far this year at least three funds have announced plans to close down because of charges or raids by government officials, including Barai Capital Management (charged), Level Global (raided) and Loch Capital (raided). Level Global and Loch saw investors redeem money as soon as possible because of the raid, even though they haven't been charged with any wrongdoing. "It's McCarthyism," says the boss of one hedge fund. "You're dead if you're accused. You're guilty unless proven innocent. It's really scary. It's destroying businesses."

Most fund managers prefer to bite their tongues. They are trying to spruce up their policies to avoid the government's wrath and reassure their anxious investors. Some have suspended dealings with expert-network firms entirely, until the SEC clarifies its views on using them.

Many are putting more money toward beefing up their compliance departments, and setting out clear rules for when traders are allowed to talk to consultants. "Hedge funds are going to need to have the same quality of compliance officers that banks have," says Stephen Bainbridge, a professor at University of California, Los Angeles, School of Law. One hedge-fund executive thinks that some funds will move to operating a single trading book, rather than multiple books, in order to have more oversight over individual traders for whose actions they are liable.




All of which makes an already difficult fund-raising environment for small funds even rougher. Investors want to make sure that managers have clear compliance policies in place. That favours larger funds, which can afford the extra safeguards. The industry's assets under management are now back above pre-crisis levels (see chart). But of the more than $13.9 billion that investors put into hedge funds during the fourth quarter, 83% went to funds with more than $1 billion under management.

Even the largest funds are not safe from government scrutiny, however. Rumours abound that the SEC is trying to target one of the industry's largest funds. And Mr Rajaratnam himself can attest that having billions of dollars under management does not keep you out of court.

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Buttonwood

# Yale may not have the key

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**When diversification doesn't work**




THERE can be fashions in investing as well as in the arts. Over the past 25 years many university endowments have moved over to the "Yale model", an investment strategy adopted by the Connecticut-based university in the 1980s. Under the leadership of David Swensen, Yale has invested across a wide range of "alternative assets", from private equity and hedge funds to timber.

The model has worked very well over the long run, for Yale at least. The university's private-equity assets have produced an annualised return of 30.4% since inception; the hedge-fund portion has returned 11.4% a year for the past ten years. The overall portfolio delivered an annual return of 11.8% over the ten years to 2009, easily beating the average endowment.

One idea behind the Yale strategy was that endowments have the luxury of time, since their liabilities (paying for new buildings, academic salaries and so on) stretch far into the future. They can thus afford to invest in illiquid asset classes. Such asset classes may offer a better return simply because other investors (mutual funds, for example) are unwilling or unable to deal with illiquidity.

In addition, the traditional dominance of domestic equities within institutional portfolios put lots of eggs in one basket. There were other sources of return-the management skills of private-equity houses, the market for distressed bonds-where the trade-off between risk and reward might be better than could be obtained from the S&P 500 index.

But the model came into question in 2008 and 2009, when the financial crisis hit. In the year to June 30th 2009, the Yale endowment fell by 24.6% and Harvard's portfolio fell by 27.3%, losing the latter a whopping $10 billion (there has been a modest recovery since then). The illiquidity of the portfolios counted against them.

The broader question is whether what worked for Yale and Harvard, for a time, can be a successful strategy for a much broader range of universities over a much longer period. Yale, in particular, has a first-mover advantage; by being an early investor in private equity it was able to get access to the best-managed funds. Later endowments found that some of these funds were closed to new money and were forced to settle for less talented managers and more modest returns.

Another problem is that diversification means more than simply a willingness to invest across a wide range of asset classes. It also requires taking a separate stance from the herd. Some asset classes (particularly illiquid ones) can be subject to a "rowing boat" effect. Mortgage-backed securities were a classic example. Everyone rushes into them, so the price rises sharply and investors pat themselves on the back for their shrewdness. Then something happens to change

sentiment. As everyone tries to rush out of the asset, the boat capsizes. The additional returns achieved during the boom turn out to be illusory.

Martin Leibowitz of Morgan Stanley has analysed the characteristics of endowment portfolios over the past ten years. He looked at three portfolios: a classic 60/40 US equity/Treasury bonds split; a Yale-like portfolio with seven separate asset classes; and a portfolio with international diversification but without the illiquid private-equity, hedge-fund and real-estate portions. What is remarkable about these portfolios is how closely correlated they all are with the S&P 500. Even the Yale-like portfolio had a correlation of more than 0.9 (where 1 is a perfect fit).

Another way to measure relationship with the market is "beta". An asset with a beta of more than 1 rises more than the market in bull phases (or falls more when the market drops); an asset with a beta of less than 1 moves less violently.

Sadly for the Yale-like portfolio, its beta rose sharply in the third quarter of 2008 when the market was in turmoil as Lehman collapsed. The beta then fell again as the market recovered in 2009 and 2010. In short, the benefits of diversification were highly diluted. In beta terms, endowment portfolios traded like a traditional 60/40 fund in the boom and then were more volatile in the bust.

Those results ought to weigh on the minds of those planning to follow the Yale example. After all, institutional investors are able these days to invest in the main asset categories for very low fees of just a fraction of a percentage point. Handing over an annual fee of 1-2%, plus a 20% performance fee, to an alternative-asset manager throws away that advantage. As 2008 showed, the asset managers get rich but the investors still get clobbered.

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Unbanked Americans

# Alienated

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**Tapping the market for financial outsiders**



Mango Financial

THE storefront for Mango Financial, a young Texan company, was designed by one of Austin's most fashionable architecture firms. It looks slightly out of place. Its neighbours are a pawnshop, a petrol station and a couple of fast-food restaurants. But its snazzy appearance is deceptive. Mango is aiming at an unglamorous market, the unbanked. It offers prepaid debit cards, free as long as clients deposit $500 a month. Its savings accounts offer a decent 5% interest rate, but only on balances up to $5,000. Neither product would tempt a billionaire. Both are better than a cookie jar.

At least 17m American adults are in households with no bank account, according to a 2009 survey from the Federal Deposit Insurance Commission. A further 43m people occasionally turn to payday lenders or cheque-cashing stores to get them through the month.

The crisis has throttled people's access to finance, by making banks more careful and by harming credit scores. But legislation to protect consumers from rapacious bankers has had unintended consequences, too. The Dodd-Frank act restricted credit-card penalties and overdraft fees, and proposed a cap on the amount banks can charge retailers for debit-card transactions. To recoup some of their losses, Bank of America, Wells Fargo, Citibank and JPMorgan Chase are all planning to stop offering free basic checking accounts. That will push some into the ranks of the unbanked.

Companies like Mango will not be able to plug every gap. Mortgage lending for America's 11m illegal immigrants is a market that has gone into reverse. Most of these people were in the cash economy until 1997, when the Internal Revenue Service began to issue Individual Taxpayer Identification Numbers (ITINs) so everyone could pay taxes. Banks were quick to see a market based on accepting ITINs rather than social-security numbers as identification for mortgage loans. By 2004 they had lent roughly $2 billion in this way. But since the downturn most banks have backed off these portfolios, thanks partly to overheated political rhetoric on immigration.

Firms are much less squeamish about the wider pool of unbanked customers, however. Big retailers like Walmart and K-Mart have cheque-cashing services, for instance. Mango is not the only one that sees a juicy market.

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## Sovereign-wealth funds

# From Tripoli to Mayfair

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**Tracking down Libya's mysterious sovereign-wealth fund**




ABOUT 30 yards from a machine-gun-toting policeman guarding the American embassy in London stands a smart town house. The nameplate by its door says Dalia Advisory Limited. The window blinds on all six storeys are drawn and no one answers the bell. But there are signs of life. A fresh cigarette butt rests on the basement fire escape. If you peek through the letter box, past the picture of a desert dune, down a corridor decorated in bland hedge-fund style, the lights are on, although no one will answer your shouts. It could be just another firm's office in London's plushest district. Except for the banner hanging outside, which reads, "Stop the bloodbath in Libya. Stop the war crime." It is not clear who hung it there.

Dalia Advisory Limited has predictably banal origins-its ancestor entity was registered in July 2009 on behalf of Instant Companies Limited of Bristol. Yet its directors are prominent Libyans and its stated purpose is to advise the Libyan Investment Authority (LIA), the country's sovereign-wealth fund, which is tasked with investing Libya's savings abroad. The LIA is thought to have some $50 billion-70 billion of assets under management and owns several stakes in big European firms including 3% of UniCredit, Italy's biggest bank, and 3% of Pearson, a media group that is a part-owner of *The Economist*.

What will happen to all those billions, which amount to some $10,000 for every Libyan? With stories still fresh of Tunisia's former first lady stocking up on bullion from the central bank before fleeing the country (reports denied by the bank), the European Union is set to impose a freeze on Libya's foreign assets. Some companies have taken unilateral action-Pearson has suspended dividends on the LIA stake.

Yet whether funds can be prevented from disappearing in the chaos of a government collapse is debatable. The bulk of the LIA's assets, say two foreigners who served on its international advisory board, sit in cash and liquid assets. These may be harder for Western governments to identify. Another observer, Peter Cole, a political-risk consultant with experience in the region, reckons the LIA also has big investments in Africa. There, sanctions may not be imposed or fully enforced.

One hope is that the LIA is sufficiently professional that the money doesn't go walkies. The two former advisory-board members both say that the plan was to create a transparent organisation. "It was run in a perfectly sensible way and there was no Qaddafi on board," says one, also noting that auditors and investment advisers had been hired. The other adds that "only a small part of the funds was driven by the will of the Qaddafis." A European executive at a firm in which the Libyan central bank (which also invests overseas) had taken a stake echoes this view. Its governor, he says, was "very professional".

Yet all these observers worry that this professionalism was only skin-deep. In any case chaos has taken hold. The governor of the central bank, who had gone missing, surfaced this week in Istanbul. According to the *Financial Times*, he says a government minister, believed to be Abdulhafid Zlitni, is now the acting boss of the monetary authority. Mr Zlitni is also the power behind the LIA, says one of the former international advisory-board members. Other LIA executives seem to have fled. Mustafa Zarti (who is a friend of Colonel Qaddafi's son, Saif, was closely involved with the fund and was a director of Dalia Advisory) has turned up in Austria. The authorities there have frozen his assets and named him as a "close confidant of the regime in Libya". He is appealing in Austria's constitutional court.

Whether Libyans' money is safe, then, may depend on the integrity of the officials still in the country. Mr Zlitni's instincts are unknown, although he is said to be a moderniser. Another LIA bigwig and director of Dalia Advisory, Rajab Mahmoud Layas, also seems to be in Libya. A phone call by your correspondent to his London home was answered by a man claiming to be his son. "Communication with Libya is quite hard," he said. "I talk to my Dad once a week." Asked what his father might think about the banners hanging outside the Dalia office in Mayfair, the man replied, "I couldn't comment. It could put my father in grave danger."

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The oil price

# Held in reserve

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**Calls to draw on the world's strategic stockpiles should be resisted for now**

TO SEE the wider effects of unrest in Libya, visit a petrol station. Americans now face prices of nearly $4 a gallon in some parts of the country. Europeans are suffering too. Spain, which gets 12% of its oil from Libya, has cut speed limits to conserve fuel stocks.

Oil traders are preparing for a lengthy absence from world markets of much of Libya's exports of 1.4m barrels a day (b/d). The International Energy Agency (IEA) reckons that around 1m b/d has stopped flowing as a result of fighting that shows no signs of abating. That looks optimistic. Several oil facilities have been damaged and only a handful of fully laden tankers have sailed since the fighting began.

Indications that other OPEC members would join Saudi Arabia in increasing output has relieved some of the pressure. The Saudis are set to pump an extra 700,000 b/d and Kuwait, Nigeria and the United Arab Emirates may add another 300,000 b/d. The price of a barrel of Brent crude, which had nudged $120, slipped back a bit this week.

Prices are likely to remain high, however, on fears of further Arab unrest and as markets adjust to different patterns of supply. That has led to calls for governments to tap oil reserves. The biggest is America's 727m-barrel strategic petroleum reserve (SPR), which lurks in caverns in Texas and Louisiana. The Japanese government controls the world's second-

largest reserves, with 320m barrels on tap, while European countries have a total of 420m. The reserves were set up in the wake of the Arab oil embargo of 1973 to blunt the effects of severe supply shocks.

Calls to draw on reserves are most vociferous in America. Some Democrats, including Jeff Bingaman, chairman of the Senate's energy committee, are in favour of raiding the SPR. The Obama administration is considering opening the valves.

That would be misguided. Using reserves would fix a problem that doesn't exist, since the gap in global supply will be plugged anyway, and it would exacerbate a problem that does: the amount of fear in the market. It may also discourage OPEC from pumping more oil. In any case, high prices have as much to do with long-term demand and supply as with unrest in Arab countries. It would be better for the world to focus on using less oil than on slowing the whirring price displays on petrol pumps.

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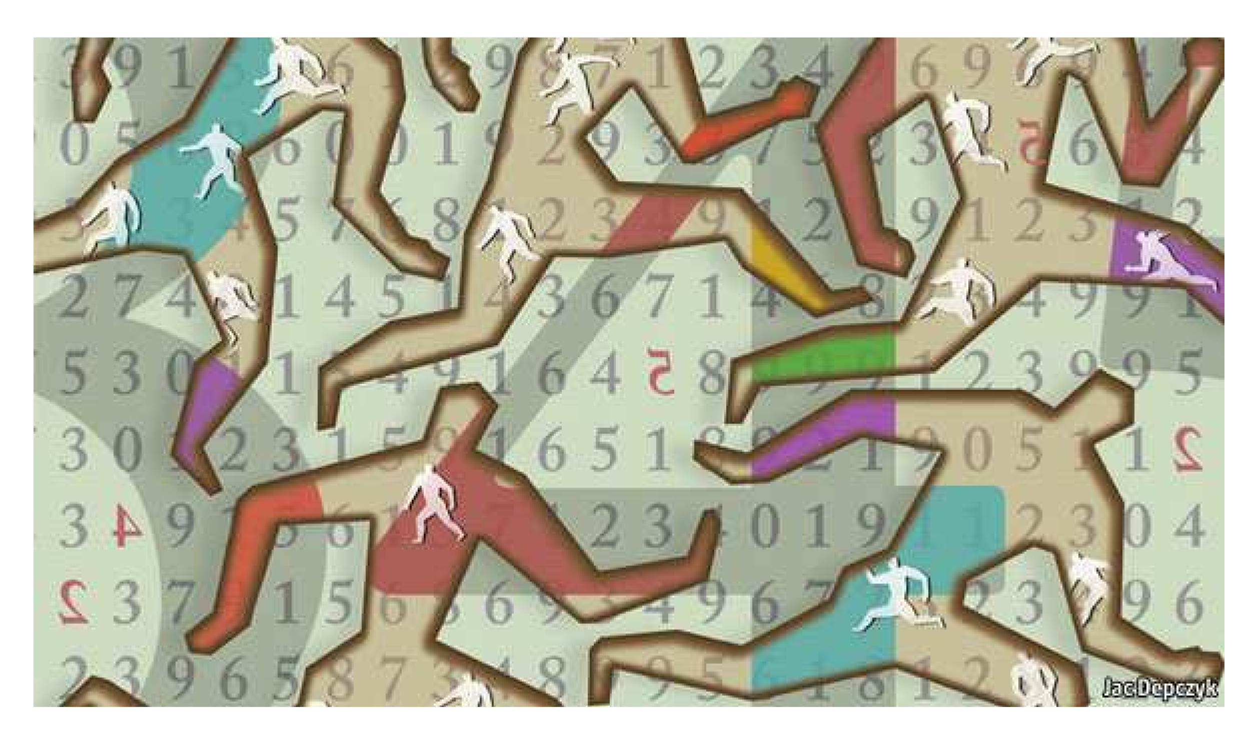
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Economics focus

# The referee's an anchor

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**A new book looks at the behavioural economics of sport**




"YOU want a fair referee, you know...You want a strong referee, anyway, and we didn't get that," grumbled Sir Alex Ferguson, the manager of Manchester United, an English soccer team, after a recent defeat at a rival's ground. Sir Alex's comments have landed him in hot water with the game's governing bodies. In his defence, he would do well to cite "Scorecasting: The Hidden Influences Behind How Sports Are Played And Games Are Won", a fascinating new book on behavioural economics and sport. Among other things it provides some compelling evidence of referee bias in favour of home teams.

The book is an attempt to test and explain a series of popular beliefs about sport by two statistics-obsessed fans, Tobias Moskowitz, an economist at the University of Chicago, and Jon Wertheim, a journalist with *Sports Illustrated*, a magazine better known for its swimsuit models than its economic models.

Sport is a multi-billion-dollar industry, they note, but its underlying economics are rarely studied. Yet it is in many ways the perfect laboratory for testing economic theories about decision-making. There is an abundance of readily available data, on everything from the consistency of a golfer's putting to the frequency of use of certain types of tactics in American football. The goals of participants in sporting contests are relatively uncomplicated (score, win, enforce the rules) and the outcomes are extremely clear, both of which help with designing theoretical models. And the stakes are often high: the sums of money involved dwarf the small amount of dollars economists typically offer participants in their experiments.

The authors dismantle some sporting myths-the Chicago Cubs, a baseball team that has not won America's World Series for over a century, are not "cursed". But other bits of pub wisdom have substance. The authors find evidence of bias by officials when they try to answer the question why home teams win more often than away teams. There is nothing imaginary about this home advantage: the home team wins 54% of games in Major-league Baseball, 60% in international cricket, 63% in English Premier League soccer and 69% in American college basketball. The authors test various explanations, but find no evidence of crowd support inspiring home players to do better; no correlation with distance travelled to the game; little, if any, statistical support for the view that home teams win because of greater familiarity with the idiosyncrasies of their stadium (like the Green Monster, a wall at Fenway Park, the home of the Boston Red Sox).

What the evidence does show, however, is that referees favour home teams in judgment calls, particularly those that happen at a crucial stage in a game. The authors focus on decisions that are less susceptible to influence by player pressure, but give some discretion to the official. If a batter chooses not to swing at a baseball pitch, the pitch is more likely to be called a strike if the home team is pitching. This tendency is most extreme in close games. In soccer, referees are more likely to award penalties to the home team, hand out fewer punishments for offences to home players, and adjust the amount of overtime played depending on whether the home team is losing (more overtime is given) or winning (less). Sir Alex is unlikely to dwell on this last point: the extra minutes that Manchester United get at home when they are trailing is known as "Fergie time".

Are referees deliberately biased? The authors think not. Instead, they blame the fact that referees, like the rest of us, tend subconsciously to rely on crowdsourcing, picking up on the mood of the crowd when making their decision. "Anchoring" is the name economists give to people's tendency to be unduly influenced by outside suggestion. Take away the crowd and the home bias shrinks, as it did a few years back when 21 Italian soccer matches were played without supporters following incidents of crowd violence. In these games the home bias declined by 23% on fouls called, by 26% for yellow cards and by a remarkable 70% for red cards, which remove a player from the game and have a particularly big impact on the result. This bias is consistently higher in soccer than in most other sports because there are many more judgments for the referee to make. If technology is ever adopted to help referees-using TV to review contentious calls, for instance-away teams should benefit most.

**Putt on the line**

Psychological biases influence decision-making by players as well as officials. "Loss aversion", the tendency for people to care more about avoiding a loss than about making a similar-sized gain, is rife even among the greatest champions. Evidence from a huge database of near-identical putts shows that, along with all the other golfers studied, Tiger Woods is more likely to hole a putt if it is to save par (in golf, an over-par hole feels like a failure) than if he had the identical putt to make a birdie (a gain). The authors argue that this is because he tries harder to avoid the loss than he does to make the gain. That makes no sense-the score versus par on an individual hole is not what matters in golf, but the number of strokes taken over the course of 18 holes. Each putt counts exactly the same, yet players treat them differently.

Another common form of behaviour is managing complexity with simple rules by, for instance, giving disproportionate weight to round numbers. In baseball a batting average of .300 (reaching first base with a hit 300 out of 1,000 goes) is seen as the difference between a decent batter and an elite one. On the last day of the past 35 seasons a batsman with an average of .299 has never accepted a walk to first base (which does not help their average). Instead they swing at pitches and either get the hit that takes them to .300 or miss and get struck out, taking their average below .299. One extra successful hit in 1,000 attempts is a trivial difference. But it matters. The average salary of a batter hitting .300 exceeds that of someone hitting .299 by 2%, a juicy $130,000.

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The aircraft of the future

# Plane truths

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**How to build greener planes that airlines will actually want to fly**




FRUSTRATING as air travel might be for the average punter, there is no let-up in demand. By 2014 the number of journeys made by individual passengers is expected to reach 3.3 billion, from 2.5 billion in 2009. In part, this is a consequence of the falling cost of flying: ticket prices have dropped by 60%, in real terms, over the past 40 years. But keeping prices low and finding more aircraft to cram all these people into is not the only thing the airline industry has to worry about. It must also clean up its act. Aviation is a small but growing contributor to global warming, responsible for 12% of the carbon dioxide emitted by means of transport. And even were that not so, fuel is one of airlines' biggest costs, so there is a strong incentive to burn less of it. In the case of fuel economy, then, virtue really is its own reward.

Not surprisingly, aircraft are already a lot more efficient than they used to be. The first Boeing 737 was launched in 1967 and could carry about 100 passengers 2,775km (1,725 miles). A modern version, the B737-800, can carry nearly twice as many passengers twice the distance, while burning 23% less fuel (48% less on a per-seat basis). More efficient turbofan engines, lighter structures, various aerodynamic tweaks and the development of sophisticated flight-management systems

have brought about this improvement. The aircraft themselves, however, still look much like they always have done: a cigar-shaped fuselage with a big tail, powered by pod-like engines hanging from a pair of protruding wings. Some aircraft designers now believe that just about all the efficiency gains available have been wrung from this traditional shape, and that for a further big cut in fuel consumption a new type of airliner is needed.

Over the years, a number of radical redesigns have been proposed, but none has taken off. Aircraft shaped like giant flying wings, for instance, would be more efficient, but do not mesh with the realities of running an airline. Banks of seating as wide as those in cinemas would strand most passengers a long way from a window-or a door. Safety legislation requires that everyone can be evacuated in under 90 seconds from half the available exits. That would be tough in a flying wing. Moreover, aircraft design has co-evolved with airport infrastructure. Existing passenger gates, baggage-handling and aircraft-servicing arrangements are not well adapted to such novelty. And, on the level of pure comfort, a steep, banking turn in such a plane would give passengers at the edge of the aircraft an experience associated more with the fairground than with commercial aviation.

**Reality check-in**

Despite all these restrictions, two groups working on the future of aircraft have come up with designs that could meet the practical needs of the industry and still cut fuel consumption by half. These researchers, at the Massachusetts Institute of Technology (MIT) and Imperial College, London, rely largely on existing technologies for many of their designs.

If a B737-800 was morphed into the shape of one of the D-series of aircraft on which Mark Drela is experimenting in MIT's wind tunnel, then it would be about the same size, could fly the same routes and would carry a similar number of passengers. But the D8.1 version (which could be built conventionally, from aluminium) would use 49% less fuel. The D8.5 (similar, but constructed from composite materials expected to be available by 2035) would burn 71% less.

Dr Drela's D-series aircraft differ from existing ones in a number of ways. Instead of having a single, cylindrical fuselage they employ two partial cylinders joined together (see above). This provides additional lift. The nose of the aircraft slants upwards, bringing still further lift. This means the wings can be thinner, saving weight. The three engines are mounted at the rear, flush with the fuselage. Placing the engines here has a number of benefits, says Dr Drela-most notably, allowing the tail to be smaller. One reason for the tall, vertical tail on an airliner is to allow the pilot to compensate with the rudder for the yaw created when a wing-mounted engine fails. Mounting the engines at the back (a design popularised in the 1950s by Sud Aviation's Caravelle, but subsequently abandoned on large aircraft) means that yaw is much reduced, and with it the need for a large tail. The D-series's twin tails are, in total, 70% lighter than a 737's single one.

The rear of the fuselage is also sculpted to sweep air into the engines using a process known as boundary-layer ingestion. Frictional drag means the air closest to the surface of the fuselage moves more slowly than the rest. Ingesting this slower air allows an engine to burn its fuel more efficiently while generating the same amount of thrust. However, employing boundary-layer ingestion means the airflow into the engine is not uniform. The farther the air is from the fuselage, the faster it moves. That can produce undesirable stress on an engine's components.

Pratt & Whitney, an aircraft-engine maker involved in the MIT project, is trying to overcome that problem by redesigning and strengthening the components in a jet engine. The other approach is to fly more slowly, and thus put less strain on the components in the first place. As a consequence, the D8.1 would cruise at Mach 0.72 (seven-tenths of the speed of sound) and the D8.5 at Mach 0.74, compared with about Mach 0.79 for a B737-800. But Dr Drela says the D-series's wider fuselage would compensate for that. It permits an extra aisle, which makes boarding and alighting much faster than on a single-aisle B737. On short-haul routes the D-series would still have a faster gate-to-gate journey time than a 737.

**Tail away**

At Imperial College, Varnavas Serghides has come up with a number of designs for lighter planes with less drag that therefore need smaller engines that burn less fuel. One of these designs has a pair of jet engines mounted aft, but positioned over and above the wing. This aircraft has no tail fins at all (see below).




In the past doing without tail fins would have created an aircraft that is difficult to fly. But things have now changed. Mechanical systems have been replaced with electrically activated fly-by-wire controls that use computers to interpret the pilot's commands in the safest and most efficient way. Many military jets would now be impossible to fly if pilots had to rely on mechanical controls alone. So, as Dr Serghides explains, doing without the horizontal stabiliser and vertical tail is not such a radical step. Aircraft-control systems that use computers are capable of mixing the signals required to make the ailerons, flaps and other control surfaces on the wing act together to produce the same effects as the rudder and elevators on the tail would. Dr Serghides has flown his design in a simulator and says it handles well.

Improving airflow over the wings is also crucial. Laminar (in other words, smooth) flow is preferable to turbulent flow, since turbulence creates drag. An aerodynamically perfect wing would have laminar flow from its leading edge all the way to the rear. But wings are not perfect, and at some stage the air turns turbulent. As a result, roughly half the fuel required to maintain a level cruise is being burned to overcome the drag imposed by a turbulent boundary layer.

Understanding what causes the transition from laminar to turbulent flow requires massive mathematical and computing power. But if Dr Serghides's colleague Philip Hall and his team can work out the details, they should be able to design wings whose shape maintains laminar flow from front to back, and thus lowers fuel consumption.

Another engineer at Imperial, Dominic von Terzi, proposes to go even further than that. Instead of just redesigning the shapes of wings, he dreams of making them more active. This could be done with surfaces that change shape, or by using a system of holes and slots that can be opened and closed as appropriate to create suction that maintains laminar flow. Moreover, in some cases a pilot might wish to do the opposite and promote turbulent flow-for example, when slowing down. That might allow aircraft to do away with flaps altogether, saving yet more weight.

In an industry as regulated and risk-averse as aircraft building, introducing these changes will prove an uphill struggle. The gains in efficiency, though, make that struggle worth pursuing. Flying wings may never come to pass. But tailless, flapless, podless planes will probably land eventually at an airport near you.

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Animal behaviour

# Drip-feeding

**Ecology raids the techniques of chemistry**



Time to change restaurant

BIOLOGISTS are sometimes accused of physics envy-and there is truth in this accusation. The essential fuzziness of biological systems can never be captured by the precise, mathematically based experiments of something like the Large Hadron Collider. Between physics and biology on the spectrum of fuzziness, though, lies chemistry. And a group of researchers led by Carolyn Nersesian of the University of Sydney has just borrowed one of chemistry's most elegant techniques, titration, to answer a pressing ecological question: how do animals choose where to feed?

Titration, to remind those who dozed through their chemistry lessons, is a way of working out the concentration of a substance in a solution. A reagent of known concentration is dripped (or titrated, to use the term of art) into the unknown solution in the presence of an appropriate indicator molecule (for example litmus, in the case of a reaction between an acid and an alkali). When the tipping point comes, and all of the unknown reagent has reacted, the solution changes colour. The unknown concentration can then be calculated from the amount of known reagent used.

In Dr Nersesian's titration the litmus was a species called the brushtail possum. The two reagents were predators and poisons. In the wild, possums feed mainly on eucalyptus trees. Feeding in trees this way also keeps them safe from ground-based predators, such as foxes. They frequently have to shift from tree to tree in search of non-poisonous leaves, though, because a tree that is being browsed starts manufacturing toxins. Dr Nersesian reasoned that there is probably a measurable point at which a plant becomes so toxic that possums prefer to take their chances with the predators on the ground-and she realised this was a perfect opportunity to do an ecological titration.

As she reports in the *Journal of Animal Ecology*, she attempted to imitate the distinction between trees and ground by giving eight possums the opportunity to feed in either of two enclosures. In one, cover was created with eucalyptus branches and light levels were kept low, mimicking an arboreal habitat. Here, the food was sometimes spiked with cineole-a poison often found in eucalyptus leaves. In the other enclosure, the food was always untarnished. However, no cover was provided and fox scent, in the form of faeces and urine, was scattered liberally around, mimicking conditions on the ground.

To start with, when the level of cineole was low, possums preferred the first enclosure. But as the drip of the titration went up, from 0% to 1% to 2% to 5% and ultimately to 10% of the food being cineole, their behaviour changed. It was not quite the sudden shift from litmus red to blue of an acid being neutralised by an alkali, but it was not far off.

When the food was toxin-free, the possums spent an average of 40 minutes of every hour eating safely under treelike cover and only 20 minutes in the risky, ground-like enclosure, and that scarcely changed for 1% and 2% cineole. The switch began at 5%, and by the time the cineole level had reached 10% the ratio of time the animals spent in the two enclosures had reversed itself-presumably reflecting, though this remains to be tested, the point at which they change trees in the wild.

Though foxes are of recent introduction in Australia (having been brought for sport by British settlers), many marsupial predators, now extinct, were present before the arrival of man in both his Aboriginal and his European forms, so the ecological system of plants, herbivores and carnivores in the eucalyptus forests would probably not have been that different in the evolutionary past. A neat illustration, then, of co-evolution between three different parts of an ecosystem-and of the value, even in biology, of precise measurement.

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Beer

## Coming to a head

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**Mathematicians invent a new way to pour stout**



The answer in black and white

ON MARCH 17th, St Patrick's day, countless pints of Irish stout will be poured in pubs and homes around the world. As they sup their beer, revellers might do well to give a nod to the technology that makes possible the creamy head which sits atop it-for unlike the natural head on an ale or a lager, the head on stout is a work of art.

To make it foam, draught stout is forced through a special plate. Bottled and canned versions require the intervention of a tiny beer-widget. This is a hollow plastic sphere that, upon the container being opened, releases a jet of gas into the beer. When introduced, the widget was the subject of an incredibly irritating advertising campaign, apparently conceived by marketing types who were terrified their customers might be put off by such an elegant piece of technology.

The widget's days, though, may be numbered, for a crack group of mathematicians from the University of Limerick, led by William Lee, has modelled bubble formation in stout beers in detail. Their work suggests that lining the rims of cans and bottles with a material similar to an ordinary coffee filter would be a simpler, cheaper alternative to the widget. The team's calculations show that a copious number of bubbles would form from air trapped inside the hollow fibres making up this lining. They have just submitted their work for publication in *Physical Review E* and are hoping that industry will soon begin testing their proposal.

Most beers are pressurised with carbon dioxide. Stouts, though, use a mixture of that gas and four times its volume of nitrogen. This makes the beer less acidic, and also produces smaller, creamier bubbles. But nitrogen is less soluble than carbon dioxide. Hence the need for the widget. And the widget adds to the container's cost, so brewers of stout would be delighted to find a way to get rid of it.

In that spirit representatives of Diageo, which owns Guinness, one of the most widely sold brands of stout, approached Dr Lee in 2009. They wondered if he might be able to construct a mathematical model of the formation and growth of bubbles in stout. Dr Lee was happy to oblige. And once he had produced the model, he started thinking more about the

problem. He wondered why the normal mechanism of bubbling in beers and sparkling wines does not appear to work in stouts.

Conventional wisdom used to hold that once the pressure inside a bottle or can has been released by opening it, the bubbles in a fizzy drink, whether alcoholic or not, are seeded by pockets of air trapped in scratches and imperfections on the surface of the glass being drunk from. Over the past decade, however, scientific scrutiny has revealed that most bubbles actually form on fibres of cellulose that have either fallen into the glass from the air or been left behind when it was dried with a towel. These fibres, which are generally hollow, trap a small amount of air in their interiors.

To see what is going on in stouts, Dr Lee and his team wrote down the equations governing the physics of the dissolved gases and fibres. They found that molecules of nitrogen and carbon dioxide are able to diffuse from the liquid through the walls of the fibres into the air pockets trapped inside them, causing those pockets of air to expand. If a pocket reaches the end of a fibre, it breaks off as a bubble.

The problem, as far as stouts are concerned, is that the low concentration of dissolved nitrogen means the process works at only a 15th of the rate seen in ales and lagers. But Dr Lee has an answer to that: more cellulose. He and his team spiked their beer with extra fibres from a cut-up coffee filter and watched the bubbles form under a microscope. By crunching the numbers from these observations, they calculate that lining a can of stout with nine square centimetres of fibres should form a head as good as that produced by a widget. If their method works on an industrial scale it will have two benefits. Stout will be cheaper. And those irritating adverts proclaiming that you do not need to know how a widget works in order to enjoy its benefits will disappear for ever.

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Western civilisation

# A success that looks like failure

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**The West's long run as top dog may be ending. But the values that made it great, consumerism included, have been sold on to the rest of the world**

**Civilization: The West and the Rest.** By Niall Ferguson. *Allen Lane; 402 pages; pound25. To be published in America by Penguin Press in November; $35.* Buy from Amazon.co.uk




THE two great issues of the age, Niall Ferguson believes, are how a handful of Western countries came to dominate the world, and whether their domination is now threatened by the rise of Asia. Not one to shrink from epic questions, Mr Ferguson, a British historian, has written a dazzling history of Western ideas that sets out to provide the reader with epic answers. Broadly speaking, he is more successful in explaining the West's triumph than in forecasting its fate.

Mr Ferguson starts with the overwhelming success of European civilisation. In 1500 Europe's future imperial powers controlled 10% of the world's territories and generated just over 40% of its wealth. By 1913, at the height of empire, the West controlled almost 60% of the territories, which together generated almost 80% of the wealth. This stunning fact is lost, he regrets, on a generation that has supplanted history's sweep with a feeble-minded relativism that holds "all civilisations as somehow equal".

After that swipe, the book goes on to devote a chapter to each of the six ingredients that Mr Ferguson thinks together explain Western success (try not to be put off when he calls them the West's "killer apps"). Science, medicine and the protestant work ethic are familiar characters in this drama. More unusual are the grubby commercial trio that Marxist historians often underestimate: competition, property rights and the consumer society.

The pace is brisk thanks to Mr Ferguson's technique of weaving contrasts between the West and the rest. These include the riotous and merciless competition for spices between European merchant-explorers, next to the static perfection and, ultimately, the stagnation of the Forbidden City in imperial China; the more-or-less free inquiry of Thomas Hooke and Isaac Newton in 17th-century England (see article) versus the demolition of Takiyuddin's "blasphemous" observatory in 16th-century Istanbul; the respect for private property among the pioneering middle-class of north America, contrasted with the misery of an underclass south of the equator that had little hope of wealth except by rising up against its abusive landlords.

Mr Ferguson is almost gleeful when he argues that the consumer society, butt of the *bien pensant* left, was the cog in the industrial machine that communism overlooked. "Capitalists", he writes, "understood what Marx missed: that workers were also consumers. It therefore made no sense to try to grind their wages down to subsistence levels." By contrast, although Soviet Russia could produce fighter jets and H-bombs, its jeans were rubbish.

Historians will find things to pick at-how could they not in a whistle-stop journey through 600 years? The politically correct will bristle at Mr Ferguson's defence of empire-though he does not shy from its enormities. But the book's main weakness lies when it comes to the second question: is the West doomed?

Mr Ferguson presents a thesis that the West risks not the genteel decline of old age so much as collapse. As a highly complex system, civilisation has a "tendency to move quite suddenly from stability to instability." That, he argues, was what happened to Ancient Rome, the Ming dynasty in 17th-century China, the Bourbons in 18th-century France, 20th-century Britain and, most recently, the Soviet Union. The West's present fiscal crisis might yet prove to be a symptom of the rot within.

Leave aside whether the rule of Caesars was really shattered in a generation or whether the French revolution marked the end of a civilisation. The trouble with Mr Ferguson's view that the West may collapse is that he also believes Asia is adopting the West's values. China, following the path of Japan, is harnessing Western science, medicine and technology, and encouraging its hard-working people to become consumers and, within limits, to own their own homes. That is not so much a defeat of the West as its triumph.

Unless Asia has any exclusive "killer apps" of its own, it is hard to see how such a triumph could alone condemn the West to disaster. Whereas a handful of Western countries were once at it, a whole planet has started to join in. More likely than the end of civilisation-and more boring-is that the West will just cease to be special.

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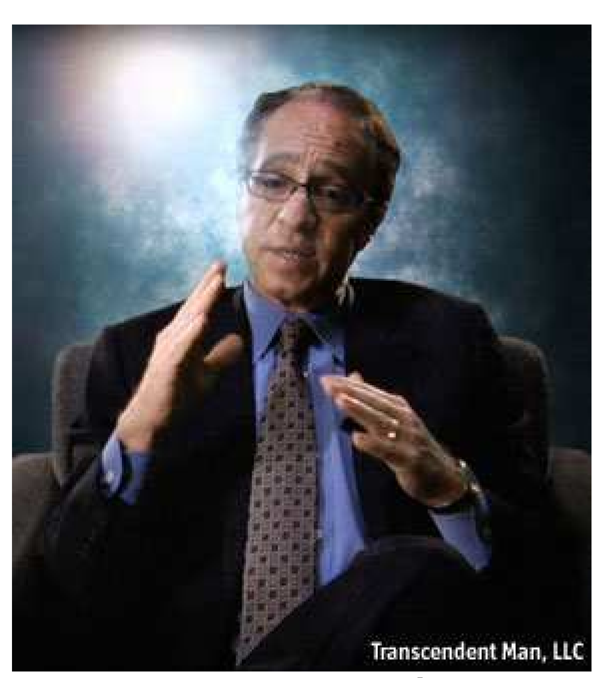
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Futurology (1)

# The new overlords

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**Man and technology are evolving together in radical new ways**



Visionary Kurzweil

CAN machines surpass humans in intelligence? People were shocked in 1997 when IBM's Deep Blue computer beat Garry Kasparov, a Russian grandmaster, at chess. But winning a board game is a trivial task compared with understanding

the complexities and idiosyncrasies of human speech. The company has now developed Watson, a supercomputer it thinks is capable of understanding "natural language".

To put this claim to the test, IBM arranged for its creation to compete in "Jeopardy!", an American quiz show known for using clues and wordplay that even bright humans struggle to understand. In the contest, televised in America in February, Watson trounced the two most successful previous champions of the quiz.

This victory fits nicely into Ray Kurzweil's vision. An inventor and futurist, he has long predicted the rise of intelligent machines. "Transcendent Man", a new documentary film, probes his breathtaking, possibly balmy, vision of the future.

Mr Kurzweil leads an influential cabal of techno-optimists, a group that includes Silicon Valley stars, scientific grandees and even the Obama administration's chief information officer, Vivek Kundra. They believe mankind is heading for a glorious post-biological era known as the Singularity. Thanks to implants and other enhancements, humans will improve along with machines. But artificial intelligence will inevitably surpass the human kind-and will do so, according to Mr Kurzweil's calculations, as early as 2029.

Predicting what will happen after that point is difficult, he argues, because we cannot hope to predict the behaviour or evolution of hyper-intelligent machines. But he insists that "the intelligence that will emerge will continue to represent the human civilisation, which is already a human-machine civilisation."

Mr Kurzweil's journey as a futurist began when he became intrigued by rapid advances in computing capacity. Scrutinising the progress in other realms of modern technology, he found the same explosive growth. This "law of accelerating returns" underpins the modern digital economy.

He argues that this technological acceleration affects many industries. For example, the rate of expansion of solar energy has been doubling every two years for the past two decades which, he insists, means that solar power will meet all energy needs in 20 years. When the human genome project started, sceptics argued it would take centuries to scan an entire human genome using prevailing technologies; in fact, thanks to exponential advances in sequencing technology, it was done in less than 15 years.

But what if the biggest breakthroughs come in improving man himself? Some technology experts think mankind will transform itself into a fitter, smarter and better-looking species in coming decades-a blink of an eye in evolutionary terms. Juan Enriquez and Steve Gullans argue in "Homo Evolutis", a new electronic book, that the leapfrogging advances seen today in biotechnology, gene therapy, epigenetics, proteomics and a myriad of related fields are turbocharging evolution itself. "Forget the Singularity-biology will trump technology," insists Mr Enriquez.

The authors argue that mankind has at last become the first species capable of deliberately directing its own evolution. Some of this is being done to improve looks or athletic performance; other techniques are extending life or growing vital organs. Along the way the human species is being changed. There is no master plan, the authors insist, as it is "not one technology, government, company, region or discipline that is driving speciation."

As with Mr Kurzweil's forecasts for machine super-intelligence and post-biological bodies, these predictions raise hackles in the scientific establishment. But even if the futurists are wrong about the pace of change, they may turn out to be right about the direction. In his final "Jeopardy!" answer, one of the human contestants conceded defeat by scribbling a cheeky line from "The Simpsons" television show: "I, for one, welcome our new computer overlords."

"Transcendent Man" was released on iTunes and On-Demand on March 1st. It will come out on DVD on May 24th. "Homo Evolutis: Please Meet the Next Human Species" is by Juan Enriquez and Steve Gullans. Amazon Digital Services; 58 pages; $3.44. Amazon Media; pound2.15 (Kindle editions)

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Futurology (2)

# Suspension of disbelief

**Known unknowns and unknown unknowns**

**Physics of the Future: How Science Will Shape Human Destiny and Our Daily Lives by the Year 2100.** By Michio Kaku. *Doubleday; 416 pages; $28.95. To be published in Britain by Allen Lane in May; pound22.* Buy from Amazon.com, Amazon.co.uk

A MORE sober look at the future comes from Michio Kaku, who teaches theoretical physics at the City College of New York. Setting out to chart the direction technological progress will take in the 21st century, Mr Kaku is aware that history is replete with unfulfilled prophecies. To avoid his joining their ranks, he adopts a cautious three-pronged strategy.

First, he rejects any ideas that are at odds with what is currently understood about the fundamental laws of physics. No teleportation, wormholes or flitting between dimensions, then, at least until 2100, when Mr Kaku's story ends.

Second, he dismisses innovations which, though possible in theory, go against the grain of human nature. Psychologically, man has changed precious little from the savannah-roaming brute of 100,000 years ago and is unlikely to do so in the next century. One example is humans' preference for the palpable. This would explain why, say, the oft-prophesied paperless office never came to pass.

Third, Mr Kaku enlisted expert help from over 300 prominent boffins, including a dozen Nobel laureates. His interviews yielded an entertaining account of envelope-pushing research in fields as diverse as medicine, nanotechnology, energy and computing, and he makes a good fist of explaining the difficult concepts that fill the pages of top-notch scientific journals today.

What of the nine decades to come? Here, speculation begins. Telekinesis will be commonplace, with appliances controlled by brain scanners; microscopic sensors will continuously monitor cells for signs of danger, extending human life span; internet-enabled contact lenses will tag anything and anyone in sight, enabling omniscience on demand. In short, by the dawn of the 22nd century man shall, in the eyes of his early 21st-century forebears, wield godlike powers. Hyperbole aside, such claims are not that far-fetched. After all, technologies seen as humdrum today, like cars, aircraft, computers and mobile phones, might have inspired similarly divine awe a century or so ago.

Their 21st-century equivalents will also prove just as disruptive to economies, labour markets and societies. But perhaps not always in ways people fear. More robots need not, for instance, bode ill for all blue-collar workers, merely those with repetitive, assembly-line jobs. There will always, he argues, be a demand for certain types of manual labour.

However bold his view of the future, Mr Kaku may be treading too carefully. His problem is that technological prognostications sound credible only if underpinned by physics known today. Yet many technologies now taken for granted would have been impossible but for relativity and quantum mechanics, two theories that upended human understanding of the universe early in the 20th century. If history is any guide, thinking that no such revolution will be wrought again is complacent-and probably wrong. On the other hand, scientific theories cannot be predicted; they must be formulated and confirmed. Call it the futurologist's paradox.

The birth of modern science

# Last of the sorcerers

### The men of the scientific revolution

**The Clockwork Universe: Isaac Newton, the Royal Society, and the Birth of the Modern World.** By Edward Dolnick. *Harper; 400 pages; $27.99.* Buy from Amazon.com

THE 1600s were not, on the face of it, an obvious candidate for the description of the "age of genius". It was a world in which everyone was God-fearing and when everything from floods to comets was seen as the inscrutable (and unchallengeable) will of a jealous, stern deity.

Yet it was from this unpromising soil that the modern, scientific world-view bloomed. Edward Dolnick's project is to chronicle the thinkers and the discoveries that made it possible. The result is at once a biography of men such as Gottfried Liebniz, Isaac Newton and Johannes Kepler, a layman's description of the significance of their work and an evocative piece of cultural history. It is the story of humanity's (or at any rate Europe's) liberation from a pious fatalism that saw every fire and plague as divine punishment for some mortal transgression or other.

The crowning achievement of the age-Newton's *PhilosophiÃ¦ Naturalis Principia Mathematica*-is among the most influential books ever written; those with the mathematical fortitude to make sense of its deliberately obscure diagrams are struck dumb with admiration. The equations derived by the eccentric genius are still used to design cars, build bridges and send spacecraft into the cosmos.

But the legacy of the age is more than just a set of useful theories. The intuition of men like Newton and Kepler that, beneath the apparent chaos of everyday life, the universe is a regular, ordered machine that can be described with a few simple equations proved-amazingly-to be correct. It is this idea of universality that is the true legacy of the scientific revolution. That the same simple rules describe the fall of an apple, the flight of a cannonball and the movements of the heavens is hugely heartening, for it suggests that despite its fearsome complexity, the universe is something that can be comprehended by mortal minds. That, in turn, opens the way to the modern notion of progress. After all, what is comprehensible can be tinkered with and, in time, improved.

The standard account tells us that the new science broke the stranglehold that the church and a few of its favoured pagan thinkers (chiefly Aristotle) had exerted for centuries on Western thought. That is broadly true, but as Mr Dolnick demonstrates, the reality was a good deal more complicated. The proto-scientists did not spring into being as paid-up believers in modern materialism and rationality. Newton divided his time between pursuits that today we would recognise as science and older, much more arcane disciplines such as alchemy and an obsessive search for numerological codes in the Bible. As John Maynard Keynes, a British economist, observed after buying a trove of Newton's papers, these men were not the first of the scientists, but the last of the sorcerers.

Indeed, for many of the fledgling scientists, their conviction that the universe was an orderly place sprang from their religious belief. Newton intended his great system of the world as a tribute to a dazzlingly deft geometer-god. When others took it to suggest that, once the universal clockwork was wound up there would be no further need for divine intervention to keep the planets in their orbits, he was dismayed. Like many revolutionaries, he perhaps did not comprehend the full extent of what he had helped to unleash.

New fiction

# Easy as one, two, three

**A family with funds falls apart**

**Other People's Money.** By Justin Cartwright. *Bloomsbury; 258 pages; pound18.99. To be published in America in April; $15.* Buy from Amazon.co.uk, Amazon.com




VERY little literary fiction has been written about the financial crisis in Britain. And yet the City is of abiding interest. This is one reason why "Other People's Money", Justin Cartwright's 15th novel, strikes the reader as both original and familiar.

Sir Harry Trevelyan-Tubal is a patriarch of a recognisable kind. Scion of an immigrant family from eastern Europe-"from Estonia to Etonia, as some wag put it"-he is the embodiment of the British establishment, the head of a successful private bank whose clients go back generations. Sir Harry is convalescing in the south of France after suffering a stroke. He appreciates that there should be an orderly succession at the family firm, but he can't bring himself to let go and issues daily instructions, which go unheeded, about how the bank should be run.

With his father out of the hot seat, Julian, Sir Harry's younger son, secretly "borrows" some money from the bank's pension fund as well as a family trust in Liechtenstein to try to right some losses. The funds will be repaid as soon as the bank is sold, so long as nobody finds out.

Inevitably, things start to go awry. Estelle, Sir Harry's nurse, knows how he was tricked into giving Julian power of attorney so he can effect the transfers. She has her eye on his priceless view of Collioure by Matisse. Sir Harry's much younger wife, Fleur, cannot stand his drooling and has her eye on her personal trainer. When a shut-up payment to Fleur's first husband goes astray the skeletons at Tubal & Co begin to rattle.

Mr Cartwright grew up in South Africa, but he has lived in London for many years. This gives him both insight and distance into how British imperial greed morphed seamlessly into simple greed. And though the Tubals' undoing is eventually engineered by an angry provincial journalist who hates the ruling classes, Mr Cartwright never writes simply to make a point. He has delivered a novel that is both funny and wise.

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The English language

# Speaking daggers, innit?

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**Breaking the rules of grammar**

**The Language Wars: A History of Proper English.** By Henry Hitchings. *John Murray; 416 pages; pound17.99.* Buy from Amazon.co.uk

AS EVERYONE knows it is wrong to begin a sentence with a conjunction such as "and". And a sentence cannot be grammatically correct without a verb. Ever. But where do such laws come from? Who instituted them, on what authority? Do such rules actually enhance the beauty and the meaning of the English language?

These are the explosive questions that Henry Hitchings tackles splendidly. It is a commonplace of linguistic philosophising that the way we speak and write shapes the way we think. Mr Hitchings's approach inverts that proposition: here the question is how far ideology-moral, political, aesthetic-has shaped our language.

As the author points out, there is probably not a person alive who does not have some bee in his bonnet about the way other people speak and write. Maybe it is the errant apostrophe, the splitting of the poor old infinitive, or the use of "like" as a comma. Or perhaps it is the exclamation mark, once known as the "shriek mark".

Mr Hitchings's book is a corrective to some of these linguistic prejudices. It is bracing to learn, for example, that the prohibition on splitting the infinitive is fairly recent. Pre-Victorians did not object. Chaucer was a splitter, and even Shakespeare had a go. Same story with the apostrophe: in the 18th-century authors were sprinkling apostrophes over everything. Though you may think the shopkeeper is ignorant and wrong to advertise "CD's & Video's", he has history on his side.

Mr Hitchings reviews such matters with cool erudition. He is resolutely relaxed about usage, understanding that correctitude and intelligibility are not the same. So when a London teenager issues the conversational challenge "you chattin' me shit?" the grammar may seem contorted, and the usage may be unfamiliar, but you get the picture immediately. The author explains that he is using London Multicultural, a form of English characterised by African, Caribbean and South Asian borrowings-and the relentless use of interrogative endings, like "innit?".

Linguistic hygienists have been fighting against such innovations since pen was first put to paper. It is easy to understand why. Words have always been dangerous: Hamlet promises to "speak daggers" to his mother Gertrude. But the record suggests that living languages are not in the end controllable. No way, no day.

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Palazzo Farnese

# The house that Paul built

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**A rare chance to see Rome's second most celebrated ceiling**




TWO cherubs spy on the moon goddess Diana who has been lured to earth by the beauty of a sleeping shepherd, Endymion. As the goddess embraces her beloved, one cherub holds a finger to his lips, as if telling the other: "Do not disturb". It is one of many delightful portrayals of mythological love adorning the magnificent fresco by Annibale Carracci in Rome's Palazzo Farnese. This Renaissance palace is one of the city's most impressive and, after the Sistine chapel, the Carracci fresco is its most celebrated ceiling.

Sadly for art lovers, "Do not disturb" might as well have been the motto of the French embassy which has had a 99-year lease on the palace since 1936 (and was in residence even before). Now, briefly, the current ambassador, Jean-Marc de la Sabliere, has opened most of its artistically important rooms. For the first time in history the public is being welcomed to the palace, the occasion an exhibition, "Palazzo Farnese", which runs until April 27th.

Most of the world-famous Farnese collection of paintings, monumental statues from antiquity and other objects are displayed in museums in Naples. (When the male line died out in 1731, the collection passed to Charles III, king of Naples.) In 2007, soon after Mr de la Sabliere took up his post, he had the inspired idea of uniting the family's art with the palace for which the pieces were collected. To carry out this "mad idea", loans have come, from Naples mainly, but also from elsewhere, including the Louvre. This show tells the story of the palace and of the powerful Farnese family that built it. The result is an exciting, informative and aesthetic knockout.

The exhibition occupies the *piano nobile* of the palace. Its corridors and rooms are gargantuan. In the *grande salle*, the enormous room that introduces the visitor to the Farnese desire to ally the family with mythic heroes, a copy of the Roman marble known as the Farnese Hercules (which is over ten feet or three metres tall) looks almost human-sized. Along with the Farnese Bull-a mountain of marble carved from a single block of stone, the largest surviving sculpture from antiquity-the original Hercules has stayed in Naples. These statues are too old, too precious and too heavy to be moved.

Soon the visitor is face-to-face with one of the masterpieces of Western art: Titian's portrait of Pope Paul III. Alessandro Farnese (1468-1549) was 66 when he was elected pope. His ambition, cunning and drive helped to transform a family of

the minor nobility into a major force. In 1517, to demonstrate his lofty position and to enhance it, work on the palace began. He sponsored excavations of the Baths of Caracalla in the city, thereby acquiring the most extraordinary finds. The Farnese Bull and Hercules were among them.

The palace itself is a work of art, above all the room with Carracci's luminous, lyrical ceiling. The various tableaux are shown as trompe l'oeil framed pictures. In each one, gods cavort with lusty abandon (before Alessandro Farnese became pope, he fathered four children by his mistress). Seeing this ceiling at long last is a wonderful experience, if a little hard on the neck. Unkindly, there are no places to sit anywhere in the show.

The room devoted to the feats of the Farnese proves to be something of a knockout too. Its vast walls were decorated by Francesco Salviati and his frescoes celebrate the family's heroic deeds. The men are larger than life. Between them, "windows" open on to decisive battles. This is the ambassador's office. Even now, during this exceptional open house, ticket-holders can see it only at weekends from inside a roped-off enclosure.

The exhibition's subtitle " From Renaissance Palace to French Embassy" spotlights a propagandist goal. France's lease, at a peppercorn rent, expires in 2035. The country is justly proud of maintaining the building so well; it also cherishes the prestige its ambassadors gain from holding meetings in its rooms. The fact that its occupation of a treasure house keeps the public out is a trickier subject. Publicity for the show, its catalogue and wall-texts are in Italian, of course, but also in French. Most of the objects on loan advance the educational mission: instructing visitors about the Farneses and their close relations with France. Art rather suffers as a result.

The great majority of the masterpieces remain in Naples, and can and should be seen there. But also go, if you possibly can, to Rome this spring to see the Palazzo Farnese and its glorious rooms.

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## Jane Russell

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**Ernestine Jane Geraldine Russell, actress and object of desire, died on February 28th, aged 89**



PEOPLE seemed naturally to think in twos when Jane Russell's name popped up. Bob Hope, her favourite kissing partner, once introduced her as "The two and only". "What are the two great reasons for Russell's success?" demanded the posters for her first and most censor-bitten film, "The Outlaw", in 1943. American GIs, who worshipped her, gave her name to the twin hills that dominated a battlefield in Korea. And the little aircraft sent aloft to publicise "The Outlaw" over Pasadena simply made two large, hazy circles in the sky, with a point at the centre of each one.

The pair in question were neither voluptuous nor pneumatic by the standards of silicone inflation that came later. Miss Russell herself denied that they were even a size 38. A modest 36B was all she claimed. But Howard Hughes, strange, shy, intense and beetle-browed, fell in love with them, and decided that much of the money he was dispensing through Hollywood in the 1940s should go towards advancing them. In his words, "We're not getting enough production out of Jane's breasts." He ensured they were so lit and cantilevered, so outlined by tight sweaters or framed by almost-too-low peasant blouses, so amply displayed as Miss Russell unnecessarily leant over beds or picked up items from the floor, that the whole of "The Outlaw" seemed only to be about them. Though dire from start to finish, it did cracking business. "BUST BECOMES BONANZA", cried *Time* magazine.

The beautiful breasts, however, were only one reason for the double vision. For there were also two Jane Russells. One was the woman whose lips devoured the screen as she closed in for a kiss; whose best-known publicity poster showed her lying in a haystack with her clothes falling off, and a pistol silkily approaching her naked thigh; who cavorted regularly in foam baths from which one leg, with pointed toe, would dangle out; and who performed, in "The French Line" in 1954, a number so raunchy, in a swimsuit so minimal, that the Catholic Church proclaimed it was a mortal sin to watch her. The other Jane Russell was a Bible-studying, born-again Christian, who went to church in Hollywood; who voted Republican; who tried to save Marilyn Monroe (Marilyn said it wasn't her thing); and who was as likely to burst into a chorus of "Do Lord" as to slink magnificently round a stage purring that she didn't mind trouble, "if trouble looks like a man."

Interviewers never quite understood how the two were kept in harness. But Miss Russell saw no problem there. She approached life with firm practicality, just like her tough-jawed character Dorothy Shaw in "Gentlemen Prefer Blondes" (1953). Complications, or feminine fussiness, weren't a part of her. Where Hughes, convulsed with adoration, agonised over the "engineering problem" of simultaneously freeing and confining her breasts, she simply threw aside the seamless, aerodynamical "bullet" bra he made for her and covered her own with Kleenex to achieve the same effect. When sweet, fluffy Marilyn got panicky while filming "Gentlemen", she would stop by her dressing room each morning to lead her, like a comforting big sister, on to the set.

**The Lord's path**

Her career philosophy was similarly plain and simple. At five, she had given her heart to the Lord among the orchards of the San Fernando Valley. He chose her path for her, and that path led to Hollywood. There couldn't possibly be sin in it. Her mother, a travelling player-turned lay preacher, never thought sexy acting was of the devil, and neither did she. "Christians have bosoms too, you know," she snapped at a reporter. If her life took hard turns sometimes-unwise affairs, a botched abortion, too much alcohol, or just the way cameramen would keep trying to ambush her cleavage from high vantage points-she still knew He had it all planned out for her.

That had to be, because otherwise her casting photograph, which an aide threw out of the pile, would never have reached Hughes, and he would never have rescued her from life as a chiropodist's receptionist in Los Angeles. In the mid-1950s, still besotted, he put her under contract to make six films for him for $1,000 a week for 20 years. She kept him at arm's length, however, considering him not her type and "too sweet"; she preferred big, brawny, take-charge men like her first husband Bob, a star quarterback with the Los Angeles Rams. She escaped from Hughes and his RKO Pictures to make both "Gentlemen Prefer Blondes"-in which she danced fabulously with Marilyn in tight red lame and feathers-and "The Paleface" (1948) with Bob Hope, in which she played Calamity Jane. But when all was said, her films were few, and memorable mostly because she was so lovely in them.

After the age of 30, as she said herself, there was really very little for a woman to do in Hollywood. She became better known for fund-raising, evangelism, campaigning to loosen the adoption laws-and TV ad campaigns for Playtex bras. In one, she held up a large white number against a scene of waves breaking on the Pacific coast. It was hard to look at it without remembering one judge's words as censors descended on "The Outlaw": that Miss Russell's two breasts hung over the film like summer thunderclouds.

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